NICER GO Cycle 3 - List of Accepted Proposals

Prop #	Title	PI Name	Abstract
4007	FOLLOWING A NEW MAGNETAR OUTBURST WITH NICER AND NUSTAR	ALICE BORGHESE	Magnetars are a small class of isolated neutron stars believed to be powered by their huge magnetic fields. They go through long stretches of quiescence, interrupted by periods of activity in the form of short X-ray bursts, giant flares and yearly-timescale X-ray outbursts. Multi-band observations of these transient events yield the largest amount of information on magnetars emission, allowing to test the theoretical models on a variety of phenomena and source states. We propose a joint NICER (100 ks) and NuSTAR (90 ks) ToO program (1 trigger of 20 NICER observations and 3 NuSTAR pointings over a month) aimed at gathering new physical insights on magnetar surface and crust, magnetic field configuration and magnetospheres.
4009	MONITORING SMC X-1'S REPROCESSED EMISSION DURING AN EPOCH OF SUPERORBITAL PERIOD EXCURSION	KRISTEN DAGE	SMC X-1 is thought to have a warped, precessing accretion disk (as evidenced by superorbital period modulations that range from 45-60 days). The superorbital period is projected to take a fourth excursion over the next 3 years, and over that time the superorbital period will change from ~60 days down to around 45 days. This implies that the accretion disk configuration is changing during this time. Previous work has well demonstrated that the shape of the soft pulse periods (i.e. the reprocessed emission) changes within a single 60 day cycle. This proposed program would use NICER to monitor the spectral shape and pulse profiles of SMC X-1 as the superorbital period takes a rare excursion and use this exceptional dataset to probe the physics of this warped, precessing accretion disk.
4017	OBSERVING THE NEXT X-RAY BINARY - RADIO MILLISECOND PULSAR TRANSITION WITH NICER	SLAVKO BOGDANOV	In recent years, three millisecond pulsar binaries have been observed to switch between accreting and rotation-powered pulsar states, thereby unambiguously establishing the long-suspected link between low-mass X-ray binaries and "recycled" pulsars. In the low-luminosity accreting state, they exhibit X-ray and optical variability unlike anything observed in other X-ray binaries. We propose a continuation of the NICER Cycle 1 and 2 Target of Opportunity program to trigger on the next nearby binary recycled pulsar transformation to an accretion disk state. This would result in an improved understanding of the peculiar phenomenology of these systems, which, in turn, may shed light on the little-understood physics of the quiescent regime in NS X-ray binaries.

Prop #	Title	PI Name	Abstract
4018	CATCHING X-RAY TRANSIENTS ON THE RISE WITH XB-NEWS AND NICER	JEROEN HOMAN	Observing campaigns of black hole and neutron star transients have long relied on triggers from X-ray all-sky monitors or wide-field cameras. However, due to the limited sensitivity of these instruments, the early rising phase of outbursts is typically missed. Here we propose a NICER monitoring program of known transient LMXBs that is triggered by detections of optical outburst activity with the Faulkes Telescopes/XB-NEWS. This allows us to catch transients as they emerges from quiescence in X-rays. With our program with aim to test the disk-instability model in LMXBs, follow the early X-ray spectral/ variability evolution of an outburst, and search for extended absorbing structures. We request monitoring campaigns for two transients, each with daily 2 ks observations for 20 days.
4022	MEASURING EARTH'S ATMOSPHERIC DENSITY AND COMPOSITION FROM OCCULTATIONS OF THE CRAB NEBULA	SATORU KATSUDA	We will measure vertical atmospheric density profiles in the altitude range of 80-180 km, based on atmospheric occultations of the Crab nebula with NICER/XTI for a total exposure time of 26 ks. The density profiles will be much more accurate than ever obtained in X-rays, and will be critical to establish the possible density deficit at altitudes ~100 km suggested by some earlier observations and theories. Thanks to NICER's excellent throughput and time resolution, we will derive a density profile for every single occultation scan, and thus will be able to investigate seasonal variations of the density profiles. Revealing seasonal variations of the O/N density ratio is especially important to understand the cause of ionosphere's annual anomalies such as the seasonal TEC variations.
4031	NICER TIMING OF THE TRANSITIONAL PULSAR PSR J1023+0038: A UNIQUE TESTBED FOR LOW-LEVEL ACCRETION PHYSICS	SLAVKO BOGDANOV	In 2013, PSR J1023+0038 transformed from a rotation-powered radio millisecond pulsar state to an accretion-disk-dominated X-ray pulsar state, where it has remained since. In its current accretion-disk state it shows coherent X-ray pulsations, suggestive of active accretion onto the neutron star surface at very low luminosities (~10^33 erg/s). Using these pulsations we have found that in the X-ray state the pulsar is spinning down ~25% faster than in the radio state. We propose to extend our long-term timing solution with NICER through an impending state transition in the near future, which would be immensely helpful for understanding how tMSPs undergo sudden state transitions and enable us to constrain accretion models.

Prop #	Title	PI Name	Abstract
4033	NICER TOO OBSERVATIONS OF THE REPEATING FAST RADIO BURSTS 121102 AND 180301.	SIBASISH LAHA	The highly active, repeating FRBs 180301 and 121102 have shown perplexing polarization properties in radio band. Detection of emission in X-rays with a measure/limits on the efficiency (Eta) are therefore crucial to establish/confirm if indeed the emission mechanisms are the same as those predicted by polarization angle measurements. We propose to observe the sources each with an exposure of 50ks with NICER during their active phases, following triggers from the FAST radio telescope. Following the trigger, NICER and FAST will observe the sources as simultaneously as possible. We expect our NICER observations to be simultaneous with 20-30 radio bursts from the sources.
4034	REVERBERATION MAPPING WITH THE NARROW FE K LINE IN MCG-05-23-16	ABDERAHMEN ZOGHBI	Challenges to the standard model of the circumnuclear environment in AGN were found in recent observations of local AGN. The narrow Fe K line in X-rays is a powerful probe of these environments. Recent observations of the brightest Fe K line in NGC 4151 enabled the emission region to be localized using the line asymmetry and the reverberation delay. It was found that a significant fraction of the line is emitted in a region smaller than the BLR. This is a new powerful tool to probe the circumnuclear environment of the black hole. Here, we propose to monitor MCG-5-23-16 for 100 ks over a six months period to track the Fe K line variability and search for time delays. The unique monitoring capability of NICER will allow unprecedented view of the line emitting region and its location.
4036	NICER MONITORING OF THE PERIODIC FAST RADIO BURST 180916, DURING ITS ACTIVE PHASES.	SIBASISH LAHA	The repeating FRB 180916 has been of great interest to the scientific community very recently, after it has been detected with a 16.35 days activity cycle. The source is one of the nearest among the FRBs (150 Mpc), and also well localized in the sky, making it a unique testbed for multi-wavelength follow-up studies to unravel the origin of FRBs. We propose to observe the source with NICER for a total of 50 ks during the 5 days of bursting phase, particularly covering the the 0.6 day long peak burst phase. The burst rate of FRB180916 is about 1-2 per hour, therefore we expect to be contemporaneous with at least 20 radio bursts during our 50 ks observation. Any detection in the X-ray bands from the FRB will be a seminal discovery in the field.

Prop #	Title	PI Name	Abstract
4039	BLACK HOLES TRANSITIONS: NICER AND MULTIWAVELENGTH	TOMASO BELLONI	Black hole X-ray binaries (BHXBs) cycle through different accretion states rapidly, providing a time-resolved view of how matter behaves in a strong gravity environment. Simultaneous multi-wavelength observations are the optimal tool that exposes this view. However, these campaigns (connecting the evolving accretion inflow and jet outflow) have been rarely achieved. We request a TOO consisting of five 10ks NICER visits of a BHXB as it transitions from the hard to the soft state to complement Astrosat/INTEGRAL coverage. Our target list contains 15 candidates. We target the transition to reveal both the rapid orbit-to-orbit X-ray variability and the slower X-ray variability that characterize the significantly changing accretion disk (derived from X-ray spectra and timing).
4040	A NICER VIEW OF BLACK HOLE X-RAY BINARY OUTBURSTS IN THE SOFT X-RAY BAND	JIACHEN JIANG	We request a monitoring program of one of six black hole transients with low Galactic reddening when in outburst, consisting of 20 observations each with 6 ks exposure. With our proposed observations, we will be able to study the inner accretion process during an outburst, such as the inner radius and the temperature of the disk. In particular, we will measure the inner disk density and compare the densities in different states. Previous tests for the high density disk model focused on sources with moderate Galactic column density. No soft X-ray observations without pile-up effects for our proposed transients are available in the archive. Our observations will be triggered by the MAXI and Swift-BAT monitoring program.
4043	CATCHING THE NEXT OUTBURST OF IGR J00291+5934	PETER BULT	We propose to observe the next outburst of the AMXP IGR J00291+5934 with NICER. Specifically, we request a total of 150 ks in observing time to monitor the full 2-week outburst at high cadence. We expect that this monitoring campaign will yield a rich data set that allows for multi-faceted investigation of this accreting pulsar; including a study of the long-term neutron star spin evolution and torquing mechanisms driving it; the binary evolution of AMXPs; and the magnetospheric interactions between the variable accretion flow and the neutron star itself.

Prop #	Title	PI Name	Abstract
4044	COMPTONISATION AS THE RADIATION MECHANISM BEHIND THE LF QPOS IN BH LMXBS: EXPLOITING THE POWER OF NICER AND NUSTAR	FEDERICO GARCIA	BH LMXBs show prominent low-frequency QPOs in their power-density spectra, with fractional amplitudes that increase with energy and complex lag spectra. The question about their physical origin remains unanswered. Simultaneous observations with NICER and NuSTAR in the soft and hard X-ray bands will allow us to probe the radiative mechanism that modulates the energy-dependent timing properties of these LF QPOs. This information is crucial to unveil the physical mechanism that produces these QPOs, both dynamically, either connected to Lense-Thirring Precession or through instabilities in the hot accretion flow, and radiatively, via Compton amplification in the corona where the observed spectral-timing properties are imprinted onto the X-ray emission.
4045	FOLLOWING THE VANISHING PULSATIONS OF IGR J17062-6143	PETER BULT	We propose to observe the AMXP IGR J17062-6143 for a total exposure of 100 ks during the NICER cycle-3 GO program. With these observations we will be able to measure the very small pulse amplitude of this source, or place a physically interesting upper-limit on the presence of pulsations. This allows us to determine the long-term evolution of this pulsar under the influence of sustained low-level mass accretion.
4047	TWO X-RAY SNAPSHOTS OF THE EXTRAORDINARY CHANGING-LOOK AGN MRK 1018	ALISON COIL	We propose 2x40 ks NICER monitoring of the changing-look AGN Mrk 1018. In 2015 our team discovered this highly unique AGN in which we are witnessing an on-going accretion transition. Monitoring Mrk 1018's immediate behavior with NICER observations is urgently needed as the most recent X-ray and optical data points provide strong evidence for a current dimming of the source after a steady state for ~3 years. The new data will reveal how the X-ray emitting corona responds to the ongoing changes in the black hole's accretion rate, by measuring the flux and photon index. We will also track the evolution of the wavelength-dependent SED (in combination with an already approved optical monitoring program), as well as determine why Mrk 1018 repeatedly changes in luminosity.

Prop #	Title	PI Name	Abstract
4049	MONITORING MAGNETARS WITH NICER	GEORGE YOUNES	Magnetars are young highly-magnetized isolated neutron stars with emission peaking in the X-ray band. The decay of their super-strong magnetic fields fuels their high energy radiation. Here, we propose a yearly monitoring program of six magnetars with NICER to establish their spectral and phase-coherent timing properties. Such a campaign will refine our understanding of these unique sources by discovering new spin-up and spin-down glitches and revealing their relative strengths and recovery times, and uncover new burst and outburst epochs. Such observational results are crucial to guide the development of the crust theory in the regime of super-strong B-fields, and the link between crustal and magnetospheric physics which dictate the connection between all of the above phenomena.
4050	NICER TOO OBSERVATIONS OF SWIFT/ XRT DEEP GALACTIC PLANE SURVEY (DGPS) SOURCES	CHRYSSA KOUVELIOTOU	We propose a ToO follow up program linked to the ongoing Swift/XRT Deep Galactic Plane Survey. Phase-I is ~73% complete and has detected 150 sources, of which 110 are new/unclassified transients. Phase-II is covering 30deg<|l|<50deg and |b|>0.5deg, aimed at mapping X-ray sources with good depth and coverage to enable source identification and multi-wavelength followups. Source identification strongly depends on timing and spectral information to accurately measure time variability and X-ray flux. NICER observations are, therefore, pivotal in source classification. We request 5 ToOs, 10 ks each (total of 50ks), of new sources found in the remaining 27% of Phase-I and/or Phase-II, which will be provided to us through private consultation.
4053	FAST MULTI-WAVELENGTH VARIABILITY FROM A BH	THOMAS MACCARONE	We propose 12 observations of a black hole transient of 3.6 ksec each with NICER to be made simultaneously with VLT fast-timing measurements in the infrared. These data will be used to understand the evolution of the IR/X-ray cross-correlation function, the lags in which give fundamental information about the speed of the relativistic jets in these systems. NICER will allow high throughput and access both to the geometrically thin and geometrically thick spectral components in the accretion flow. By observing the evolution of this cross-correlation function we will be able to make the first observational study of the evolution of the jet speed in X-ray binaries.

Prop #	Title	PI Name	Abstract
4060	MAGNETAR OUTBURSTS AS A CLUE FOR UNDERSTANDING MAGNETIC ENERGY DISSIPATION AND FAST RADIO BURSTS	TERUAKI ENOTO	Magnetar X-ray outburst is sporadic magnetic energy dissipation of short bursts, giant flares, and persistent emission enhancement. The physics underlying this dissipation process is still unclear. Follow-up observations of transient magnetars with NICER have provided clues for this question, for example, detection of single X-ray pulses from the radio-loud magnetar XTE J1810-197, the burst forest from the Galactic FRB source SGR 1935+2154, and discoveries of Swift J1818.0-1607 and SGR 1830-0645. Prompt observations became much more critical after the discovery of the fast radio burst from the Galactic magnetar SGR 1935+2154 in 2020. Here we propose reserved NICER ToO observations of transient magnetar outbursts in soft X-rays coordinated with radio and hard X-ray simultaneous coverage.
4062	A NICER STUDY OF SPECTRAL VARIATIONS IN NGC 2992	MICHAEL NOWAK	NGC 2992 is a Seyfert galaxy with variations of a factor of 30 in X-ray flux as found by monitoring campaigns with RXTE and Swift. This is a “changing look" Seyfert that historically has varied between Seyfert 1.5 to 2. For the recent Swift monitoring campaign, due to both low effective area and photon pile-up, the observations are adequately described solely by a phenomenological absorbed power law. We propose a NICER monitoring campaign, which will provide higher signal-to-noise spectra capable of being fit with more realistic models that include the Fe K-alpha line. We also will search for short time scale variability within an observation.
4065	REVERBERATION MAPPING THE INNER ACCRETION AND EJECTION FLOWS OF I ZW 1	BIN LUO	Intensive accretion disk reverberation mapping (RM) observations are a powerful tool for probing the structure and physics of AGN central engine. For AGNs accreting at super-Eddington rates, the inner accretion disks likely puff up with a different radial temperature profile from sub-Eddington AGNs that could lead to a different time-lag relation. The strong disk winds in these AGNs may also obscure the X-ray emission causing poor X-ray-UV correlations. We propose to obtain 100 1 ks NICER monitoring observations of the super-Eddington accreting AGN I Zw 1, along with our proposed Swift disk RM campaign, to provide critically needed determination of the intrinsic X-ray emission and wind absorption parameters via multi-epoch spectroscopy, and thus to map its accretion and ejection flows.

Prop #	Title	PI Name	Abstract
4070	FOLLOW-UP HARD X-RAY TRANSIENTS IN THE MAGELLANIC CLOUDS	GEORGIOS VASILOPOULOS	The Magellanic Clouds (MCs) harbor a large sample of Be/X-ray binaries at a moderate and well known distance with low Galactic foreground absorption. However, their transient nature complicates observations in X-rays. We propose five triggered NICER observations of new or unexplored high-mass X-ray binaries (HMXBs) in the MCs. Our goal is to study their spectral and temporal properties, and build-up a large sample of pulsars in order to study their demographics in the MC system.
4078	TOO MONITORING OF A FUTURE STELLAR TIDAL DISRUPTION EVENT	DHEERAJ PASHAM	We propose ToO monitoring observations (2x300s per day for 200 d~120 ks) of a future stellar tidal disruption event (TDE). Our main goals are to 1) identify and study accretion states, transitions and accompanying corona formation around a supermassive black hole (SMBH) in a TDE. This follows NICER's recent success in doing so for the TDE AT2018fyk. 2) Search for the precession period of a newly formed accretion disk in soft X-rays to measure the SMBH spin. This is motivated by theoretical studies and NICER's detection of a 1.34 d quasi-periodicity in ASASSN-18EL: a changing-look AGN likely triggered by a TDE. Both our goals require excellent maneuverability, monitoring capability and a large soft X-ray effective area. At present, only NICER has all these capabilities.
4087	MONITORING OF A NEWLY DISCOVERED X-RAY BRIGHT TDE USING NICER	KATIE AUCHETTL	While compact objects undergoing regular, long-term accretion such as normal AGN are common, extreme transient accretion events associated with the tidal disruption of a star provide a novel way to probe both the physics of accretion and black holes. These tidal disruption events (TDEs) emit across the electromagnetic spectrum, with a significant part of this emission falling in the X-ray energy band. Here, we propose to perform multi-epoch NICER observations of a newly discovered, nearby, X-ray bright TDE. Complemented by ground- and space-based optical/UV observations, these observations will allow one to fully characterize the nature of the X-ray emission as it evolves.

Prop #	Title	PI Name	Abstract
4089	EXPLORING THE NATURE OF THE PROLONGED OFF STATE OF NGC 300 ULX1	PAUL RAY	It is now clear than many of the ultra-luminous X-ray sources host rotating neutron stars (NS), but some of their fundamental properties still remain elusive. Among others, we do not know if mass transfer is stable, and we do not fully understand the formation and evolution of outflows. NGC 300 ULX-1 is an ideal system for shedding light on these open questions. Its mass accretion rate remained almost constant for a period of at least 4 years, and its magnetic field is fairly well constrained. On September 2018 the system entered a low-flux state, and has remained in that state till today. Following a re-brightening of the system we propose NICER triggered observation in order to measure the pulse period of the NS, and to shed light upon the nature of this prolonged apparent off state.
4090	THE ORIGIN OF SUB-SECOND X-RAY/ OPTICAL VARIABILITY IN BLACK HOLE BINARIES	JOHN PAICE	Over the past few years, successful campaigns on a handful of galactic Black Hole X-ray Binaries have revealed remarkable sub-second variability and significant optical-vs-X-ray correlations. These promise new constraints on various physical components in the hearts of their accretion flows. But there is also puzzling complexity from source-to-source, and the exact driver of these variations remains unclear, mostly because of the scarcity of high-quality coordinated observations. Here, we propose up to 10 individual anticipated ToO observations on ~1-2 hard state outbursts with NICER, strictly simultaneous with ground-based optical/infrared timing. We will probe rapid, sub-second photometric variations as outbursts evolve, probing these systems on unprecedented, theory-critical scales.
4092	X-RAY TIMING AND SPECTROSCOPY OF NEW CATACLYSMIC VARIABLE WITH THE FASTEST-SPINNING WHITE DWARF EVER DETECTED	KAYA MORI	A recently-discovered intermediate polar, CTCV J2056-3014, has the shortest spin period (29.6 sec) among all CVs and white dwarfs. The orbital period of 1.76 hours is below the period gap where the binary orbit decays via gravitational wave radiation. Fast-spinning CVs are extremely rare and unique as manifested by AR Sco (the so-called white dwarf pulsar) and AE Aqr which spins down via the propeller effect. The proposed NICER and NuSTAR observations, motivated by the recent XMM-Newton detection, will fully explore the X-ray properties of this remarkable CV, such as spin-down rate, soft time lag, white dwarf mass measurement and search for non-thermal X-ray pulsation.

Prop #	Title	PI Name	Abstract
4094	MONITORING THE WIND STRUCTURE IN 4U 1538-522	FELIX FUERST	Understanding the wind structure, i.e., clumpiness of winds in high-mass X-ray binaries is important to learn more about binary evolution and understand a crucial part of the accretion process. The clumps strongly influence the observed X-rays, in particular through variable absorption. Here we ask to monitor 4U 1538-522 and its mass donor QV Nor for a complete binary orbit (3.7d) with 1ks snapshots every 90min. This will allow us to build an absorption and wind profile over the orbit and measure the structures close to the photosphere of QV Nor. NICER's flexibility is ideally suited for this observation campaign.
4095	EROSITA FOLLOW-UP OF AGN IGNITIONS AND SHUT-DOWN EVENTS	MIRKO KRUMPE	eROSITA, successfully launched in mid-2019, performs multiple all-sky X-ray surveys. By monitoring roughly half a million AGN/quasars, eROSITA identifies rare, accretion ignition/depletion events as they occur. We request 10 ToOs each with 20 ks to explore how the X-ray coronae in AGN respond to a sudden, major change in accretion rate. The NICER data will deliver the first medium signal-to-noise benchmark spectrum that later spectra can be compared to and to reveal the evolution of the photon index, possible intrinsic absorption, and flux. This will give valuable insights into the physics of AGN ignition/ depletion and trigger several multi-wavelength campaigns.
4096	A NICER VIEW OF RARE AND EXTREME BLACK HOLE TRANSIENT ACCRETION EVENTS	KATIE AUCHETTL	Capturing a supermassive black hole within the first few days of an extreme variable accretion event can provide us with novel probes into both the physics and nature of the black holes themselves and the physics of the accretion that they undergo. With transient surveys now detecting several extreme black hole accretion transients each year within hours of their initial outburst, it is time to begin focusing on the earliest epoch of their evolution across multiple wavelengths. Here we propose to take advantage of NICER's large effective area and rapid response capability to monitor and characterize the X-ray emission from a SMBH undergoing extreme variable accretion.

Prop #	Title	PI Name	Abstract
4097	PROBING THE RADIO-X-RAY CONNECTION IN THE FRB-EMITTING MAGNETAR SGR 1935+2154	GEORGE YOUNES	The magnetar SGR 1935+2154 recently showed the first Galactic FRB. This forged the way for new avenues to study FRBs, their connection to magnetars, and more generally radio emission from young isolated neutron stars. We propose a 360 ks monitoring campaign, much of which occurring simultaneous to radio observations aiming at answering (1) how often does SGR 1935+2154 emit radio bursts and do they always occur simultaneous to X-ray bursts? (2) What are the radio bursts rotational phases and how do they compare to the X-ray pulse? (3) what is the status of the spectral and temporal properties of the source following an immense release of magnetic energy through its most recent burst storm? Such a campaign will certainly provide a treasure trove of information for the FRB and magnetar fields.
4099	THE FIRST X-RAY POLARIMETRY AND SPECTROSCOPY OBSERVATIONS OF A TRANSIENT BLACK HOLE X-RAY BINARY	FIAMMA CAPITANIO	We propose joint NICER + NuSTAR ToO observations of a transient black hole X-ray binary (TB-HXB), to be taken in coordination with the Imaging X-ray Polarimetry Explorer (IXPE), a NASA mission that will launch in late 2021. The year one IXPE observing plan includes a ToO study of a TBHXB outburst, with one long (> 300 ks) exposure in the hard state and another in the soft state. We propose two 30 ks NICER+NuSTAR exposures during the hard state IXPE observation and one 20 ks NICER+NuSTAR exposure during the soft state IXPE observation. This will provide an unprecedented combination of X-ray polarimetry, high resolution broad-band spectroscopy and timing; yielding novel and unique information on the coronal geometry, the black hole spin and the role of jets in these sources.
4101	TESTING THE BH NATURE OF 47 TUC X-9	THOMAS MACCARONE	The source 47 Tuc X-9 is an ultracompact X-ray binary, and is one of the best candidate globular cluster black holes in the Milky Way. It shows a strong modulation with a characteristic timescale of about 1 week. If this variation is shown to be strictly periodic, it would favor neutron star models which are otherwise disfavored by the existing data. We propose monitoring this object to determine whether this long term variability is red noise or periodic.

Prop #	Title	PI Name	Abstract
4103	A NICER INSIGHT VIEW OF BLACK HOLE X-RAY BINARIES	YANAN WANG	We propose to monitor one bright black-hole transient during its outburst jointly with NICER and Insight-HXMT observations. The combination of the two satellites gives us an opportunity to perform spectral and timing studies in an unprecedented broad X-ray band, from 0.2 to 250~keV, on a daily basis. With this advantage, we will be able to calculate the phase/time lags between different energy bands, to explore the state transition luminosity, to compare the inner radius of the accretion disk derived from different models, and eventually to understand the geometry and the structure of the accretion flow in black-hole transients.
4104	INVESTIGATING THE NATURE OF NON-AGN NUCLEAR TRANSIENTS DISCOVERED BY SRG/EROSITA	ZHU LIU	During its ongoing all sky survey, SRG/eROSITA is rapidly uncovering an increasing number of transients associated with the nuclei of galaxies which show no obvious signatures of prior AGN activity. A significant fraction of these events is expected to be associated with tidal disruptions events (TDE). However, already the first results from dedicated follow-up campaigns of eROSITA-discovered events demonstrate that the reality is likely much more diverse, and that deviations from the standard TDE scenario are common. Here, we ask for NICER ToO observations for monitoring 10 eROSITA discovered non-AGN nuclear transients. The NICER data will provide vital information on the temporal and spectral evolution of this non-AGN nuclear transients population and help deciphering their nature.
4107	TIMING OBSERVATIONS OF MEV PULSARS PSR J1838-0655 AND PSR J1846-0258	WYNN HO	We propose monitoring observations of the young, highly-energetic pulsars PSR J1838-0655 and PSR J1846-0258. These sources are only easily detectable as pulsars at X-ray energies, which makes NICER the ideal instrument to conduct the necessary observations. Previous NICER data successfully yielded rotation phase-connected timing models and glitches and tracked the recent magnetar-like outburst of PSR J1846-0258. The proposed observations would extend the baseline of the timing models. These models enable detections of the two pulsars at >~MeV, which in turn provide important diagnostics on the physics of pulsar emission and magnetospheres. Multi-year monitoring of the pulsars also enables detection of further glitches and outbursts and contemporaneous searches for gravitational waves.

Prop #	Title	PI Name	Abstract
4110	NICER FOLLOW-UP OF AN EXTREME NUCLEAR TRANSIENT	ERIN KARA	X-ray observations of extreme accretion episodes provide a unique probe of the physics feedback from supermassive black holes. Whether due to some unknown disc instability or due to a tidal disruption event, such events change the accretion flow over timescales of weeks to months. This provides us with an impulse of accretion after which we can monitor how the system responds, through the formation of a disc, corona, jet or massive outflow. X-rays are an essential part in understanding these extreme accretion episodes since they probe the regions closest to the black hole. NICER, in particular, is ideally suited for X-ray follow-up because it has flexible scheduling, a large effective area and good spectral resolution. We request to follow-up one bright extreme nuclear transient event for 150 days every 3 days for 1.5 ks (for a total of 75ks), to watch the black hole release energy back into its environments after an extreme accretion episode.
4113	NICER FOLLOW-UP OF A FUTURE EROSITA QPE CANDIDATE	RICCARDO ARCODIA	Quasi-Periodic Eruptions (QPEs) are a very peculiar and new class of X-ray phenomena, only four of them are known and their origin is still an open question. Therefore, identification of more QPEs is needed. Only with eROSITA it is possible to perform a blind and systematic search of QPEs, which can produce ~3 good QPE candidates per year. However, these candidates require X-ray follow-up to confirm their nature. We ask for anticipated ToO follow-up of a future eROSITA QPE candidate to be triggered during NICER Cycle 3. For the purpose of QPEs identification, while at the same time to achieve a solid estimate of the period, we ask for a set of 8 days of observations, with 12 exposures per day each 500s-long. The total exposure is ~48 ks.
4114	THE EXTRAORDINARY TIMING BEHAVIOR OF THE CCO PULSAR 1E 1207.4-5209	JULES HALPERN	The glitch or timing noise in the rotation of 1E 1207.4-5209, the central compact object (CCO) in SNR PKS 1209-51/52, is unprecedented for a pulsar with such a small spin-down rate. It may support a timely conjecture that glitches could be triggered in CCOs by diffusion of a strong, buried internal magnetic field that rivals in strength those found in magnetars, NSs with surface magnetic fields 10**4 times greater than the dipole fields inferred for CCOs. This proposal is to continue timing 1E 1207.4-5209 to distinguish glitches from timing noise, and to obtain a sufficiently precise measurement of its spin-down rate to test for a change in surface magnetic field strength. This may allow the first measurement of magnetic field growth on a CCO.

Prop #	Title	PI Name	Abstract
4115	NICER AND NUSTAR FOLLOW-UP OBSERVATIONS OF GAMMA-RAY FLARING BLAZARS	FILIPPO D'AMMANDO	There are many open questions related to the nature of high-energy emission and the physics of jets which need to be addressed, such as the radiative processes producing the high-energy emission, the parameters of the emitting region and the jet composition. Radiative models need to be tested against MWL simultaneous SED. We propose to trigger 2 ToO observations with NICER and NuSTAR if gamma-ray flaring activity from a blazar is detected by Fermi-LAT and a high X-ray flux has been confirmed by a rapid Swift follow-up observation. The goal is the study of the broadband SED and MWL light curves for putting constraints on the physics of relativistic jets from super-massive black holes, and on the acceleration and radiation mechanisms at work in such extreme environments.
4116	TRACKING THE PERIOD EVOLUTION OF QUASI-PERIODIC ERUPTIONS TO CONSTRAIN THEORETICAL MODELS	RICCARDO ARCODIA	Quasi-Periodic Eruptions (QPEs) are a very peculiar new class of X-ray sources and their origin is still unknown. We aim to test one of the proposed scenarios, i.e. a small compact object orbiting the central super-massive black hole, by monitoring the period evolution of one known QPE source, which was already observed with NICER on August 2020. Our scientific goal can be achieved performing 2 sets of 10 days of observations separated by a few months, with each set consisting of 12 visits per day, each with an exposure of 500s, for a total of ~120ks. In this way we can either rule out the model, e.g. if a period increase is observed, or put constraints on the mass and eccentricity of the possible second orbiting body.
4117	NICER MONITORING OF ETA CAR S X-RAY EMISSION IN CYCLE 3: TOWARDS A COMPLETE ORBITAL CYCLE.	DAVID ESPINOZA-GALEAS	We request 52 ksec of observation time in NICER AO3 to monitor the recovery of X-ray emission from the super-luminous massive colliding wind binary Eta Carinae (η Car) after its most recent X- ray minimum/periastron passage. The NICER AO3 monitoring of eta Car will provide observations at orbital phases between ~4.18 and ~4.37, an orbital phase interval not observed since RXTE. The observations from the same orbital phases using RXTE have shown a decrease of flux cycle by cycle that can be related with the mass loss of the stars and which needs to be confirmed with new NICER observations. If approved, the NICER eta Car cycle 3 observations will provide coverage of nearly a complete binary orbit.

Prop #	Title	PI Name	Abstract
4118	RELATIVISTIC REFLECTION AND REVERBERATION MAPPING IN A BLACK HOLE BINARY	JINGYI WANG	Black hole astrophysics can be regarded as a fundamental tool in studying the accretion and ejection physics in the strongest gravity regime in the Universe. Reflection spectroscopy studies the time-averaged energy spectrum, providing constraints on properties in the accretion disk and the corona, but degeneracies take place in problems such as the truncation level of the disk. Reverberation mapping is a timing technique revealing the disk-corona geometry in the innermost regions, which could help break degeneracies. With recent cutting-edge developments in physical spectral-timing models, the main goal in this proposal is to find clues on the state transition mechanism, and the coupling between the disk, corona and jet in black hole binaries.
4119	MONITORING ACCRETING MILLISECOND X-RAY PULSARS IN OUTBURST	PETER BULT	We propose a general purpose monitoring campaign of the next outburst of any AMXP, known or unknown. We request a total of 50 ks observing time to be spread over the typical 2 - 3 week duration of such an outburst, so that we can follow the properties of the pulsations as a function of flux. Additionally, this even sampling of the full outburst will also allow us to characterize the non-pulsating emission through a spectroscopic and timing study.
4122	TIMING FLARING SUPERSOFT X-RAY SOURCES	MARINA ORIO	The target of opportunity targets of this proposal are a new X-ray luminous nova in outburst, and a flaring nova-like binary in the Large Magellanic Cloud, RX J0513.9-6951. Both host nuclear burning white dwarfs and will be observed as luminous supersoft X-ray sources. The main aim is to measure pulsations with time scales of tens of seconds, already detected in other such sources. These observations allow linking the periodicities with other physical parameters, in order to search for their root cause. High S/N data obtained with NICER, over intervals of tens of minutes within one or few days, are optimal for this analysis, and will give insight on the mechanism of this intriguing quasi-periodic variability.
4123	NICER DIAGNOSTICS OF THE COMET-SOLAR WIND INTERACTION WITH DEEP SPACE 1'S 19P AND ROSETTA'S 67P	DENNIS BODEWITS	We request 115 ksec of Nicer observing time to study the solar wind interaction of two comets, 19P/Borrelly and 67P/Churyumov-Gerasimenko, whose plasma environments were studied in situ by the Deep Space 1 and Rosetta spacecraft, respectively. We will use the proposed observations to study how comets respond to time-variable solar wind conditions, to provide global context to the local measurements conducted by the spacecraft, and to investigate the source of poorly understood cometary 1-2 keV emission features.

Prop #	Title	PI Name	Abstract
4124	A STUDY OF M DWARF FLARES USING SIMULTANEOUS HIGH CADENCE MULTI-WAVELENGTH DATA	RISHI PAUDEL	M dwarfs are the most abundant stars and are known to produce very strong flares. They are the prime targets of ongoing Transiting Exoplanet Survey Satellite (TESS). Understanding the M dwarf flares is very important in identifying the habitable planets orbiting them. We propose to obtain NICER data of three M dwarf flare stars which will be observed simultaneously with TESS 20-s cadence mode to construct simultaneous light curves and study the relationship between X-ray and optical flares. We aim to use high cadence data to measure flare energy equipartition with more accuracy and hence estimate the total energy output of a flaring star. Our results will be significant inputs to models that estimate the impacts of strong flares on the atmospheres of planets orbiting M dwarfs.
4128	AGN REVERBERATION MAPPING OF GAS FLOWS IN MRK 817 WITH NICER AND HUBBLE	EDWARD CACKETT	Knowledge of the structure and kinematics of gas around supermassive black holes is vital to understanding accretion and thus AGN feedback. To this end, a multiwavelength reverberation mapping (RM) campaign on Mrk 817 has been built around an already-approved Hubble (HST) Large Program. This is a rare opportunity since it is only the second ~200 orbit HST RM campaign in its 30 year lifetime. Previous RM programs have mapped the accretion disk and broad line region, but revealed that X-ray flux correlates poorly with longer wavelengths. This is a conundrum, since X-rays are thought to drive the multi-wavelength variability. We propose NICER monitoring every other day throughout to track the X-ray spectral changes (rather than just flux changes) and probe the X-ray/UV/optical connection.
4129	IDENTIFYING MODE-SWITCHING IN A NEW CANDIDATE TRANSITIONAL MILLISECOND PULSAR	SAMUEL SWIHART	A new compact X-ray binary within the error ellipse of the Fermi-LAT gamma-ray source 4FGL J0407.7-5702 has recently been discovered. Overall, the optical, X-ray, and gamma-ray properties of this source are consistent with a classification as a transitional millisecond pulsar in the accreting state, making it only the sixth such object known in the Galactic field. Here we propose NICER observations to confirm this classification and determine how similar its properties are to the other transitional millisecond pulsars.

Prop #	Title	PI Name	Abstract
4131	DO MAGNETARS POWER LS 5039 AND OTHER GAMMA-RAY BINARIES?	PAUL RAY	We plan to make NICER observations to reveal the nature of the enigmatic class of gamma-ray binaries. We will confirm and study the pulsations recently reported from LS 5039, that would make this the first magnetar-powered gamma-ray binary. We will also make the first NICER observations of two more recently-discovered gamma-ray binaries and perform deep pulsation searches. These searches will make use of sensitive algorithms that account for high accelerations in the massive binary systems.
4134	A NICER VIEW OF THE X-RAY FLARES IN IGR J16479-4514	NAZMA ISLAM	The puzzling variety of orbital phase locked X-ray flares and super-orbital modulations in the Supergiant Fast X-ray Transient (SFXT) IGR J16479-4514 indicates the presence of stable large scale structures in the stellar wind of the supergiant star. To investigate these structures in the stellar wind, we propose 25 kilosec observations of IGR J16479-4514 each at two orbital phase 0.3 and 0.7 (50 kilosec total), where these X-ray flares occur. The time of observations will be matched to the super-orbital maximum phase, where many of these X-ray bright flares are coincident. The results from hardness ratio and spectral analysis during the rise and decay of these flares will be used to constrain stellar wind models predicting the existence of these large scale structures in the wind.
4135	PROBING THE ACCRETING PULSAR CANDIDATE NGC 1042 ULX1	TANUMAN GHOSH	We propose to observe one bright and isolated ULX in the galaxy NGC 1042, simultaneously with broadband coverage by NICER and NuSTAR for the first time. Motivated by a marginal detection of pulsation in one archival XMM data with poor statistics, we want to confirm the pulsation with new NICER data. Our primary aim is to detect the pulsation of ULX1 central compact object with high confidence and study the spectral properties of the source in broad energy band. The detailed spectral study of this ULX will quantify both the soft and hard spectral components which was not possible previously because of unavailability of high S/N ratio data with broadband coverage. Therefore, we propose to obtain simultaneous observations with 50 ks of NICER and 100 ks of NuSTAR exposure for NGC 1042 ULX1.

Prop #	Title	PI Name	Abstract
4138	INVESTIGATING THE VARIABILITY OF SWIFT-BAT BLAZARS WITH NICER	SERGIO MUNDO	A time-domain variability analysis of 117 blazars in the Swift-BAT 105-month catalog reveals that a significant portion (~30%) exhibit very low fractional variability (<20%) on a monthly timescale, which is deeply at odds with previous studies that show that blazars are highly variable in the X-rays on a wide range of timescales. However, the BAT data are not sensitive to changes on shorter timescales or lower amplitude variability. We propose NICER observations of four "quiescent" BAT blazars whose variability is not detected by the BAT to determine if a subset of this population show variability at lower amplitudes and shorter timescales. The higher sensitivity per unit time of NICER and its scheduling flexibility make it an ideal instrument with which to carry out this investigation.
4139	THE DISCOVERY OF THE NEW SOURCE WITH MILLIHERTZ QUASI-PERIODIC OSCILLATIONS	GIULIO MANCUSO	Quasi-periodic oscillations (QPOs) at frequencies of millihertz (mHz) have only been reported in a few neutron star (NS) systems since their discovery. Given their close relation with the occurrence of type I X-ray bursts, numerical simulations strongly suggest that mHz QPOs are due to a special mode of burning, called "marginally stable nuclear burning". However, even though model predictions agree well with the observations, there are still many open questions. Here we propose, after having detected the mHz QPOs with any instrument, and within the next few days, 50 ksec ToO observations to study the mHz QPOs in the next NS system that shows them. These observations will allow us to test whether the oscillations can be described as temperature fluctuations originating on the NS surface.
4142	FAST TRANSITIONS OF X-RAY VARIABILITY IN BLACK HOLE X-RAY BINARIES WITH NICER	LIANG ZHANG	Fast X-ray variability, e.g. quasi-periodic oscillations (QPOs), is a distinct characteristic of black hole low-mass X-ray binaries. Fast transitions between different types of QPOs or broadband noise are sometimes observed with significant spectral changes. The study of the fast transitions can provide important evidence on what triggers a QPO and on the physical origin of the QPO, which help us better understand the mechanism responsible for the state transitions. NICER s superb time resolution and large effective area below 2 keV make it an ideal mission to study the fast transitions, especially on how the disk changes during the transitions. In this proposal, we ask for 120 ks NICER observations of next black hole candidate showing fast transitions to fully probe the spectral changes.

Prop #	Title	PI Name	Abstract
4145	EROSITA-NICER STUDY OF AGN OCCULTATION EVENTS	JOHANNES BUCHNER	The origin, structure and dynamics of the nuclear obscurer of Active Galactic Nuclei, the "torus", is still poorly understood. Drastic column densities variations are signatures of torus clumps transiting the line-of-sight, and give insight into the obscurer granularity. eROSITA's spectral monitoring of bright AGN on the entire sky enables a systematic search for such occultations on novel time-scales. NICER observations are needed to constrain crucial physical parameters, such as the column density and intrinsic luminosity. We propose to monitor the column density in depth with a systematic cadence to understand the substructure of individual torus clumps in up to three new occultations.
4147	THE OBSCURED STATE OF GRS 1915+105	JOSEPH NEILSEN	GRS 1915+105 is a black hole binary known for its unique variability, strong winds, jets, and BH spin. After 20+ years in outburst, NICER detected a huge change in this iconic source: the X-ray flux dropped by 100x! Spectra suggest a large obscuring shroud, but what is this obscuring gas? The "obscured" state is highly variable, with flares that reveal strong winds and highly-ionized absorption. We propose to study its long-term evolution with 35 weekly exposures of 2.7 ks in Cycle 2. NICER is the only mission capable of frequently monitoring this important new state. We also request 2x25 ks NuSTAR ToOs to constrain scattering and wind photoionziation. These observations will also grow a NICER legacy archive of obscured variability in GRS 1915+105.
4151	HIGH TIME X-RAY/OPTICAL OBSERVATIONS OF X-RAY BINARIES WITH NICER AND OPTICAM	ANGEL CASTRO	Some XRBs undergo dramatic short periods of X-ray and optical activity called outbursts, alternated with long periods of quiescence. Multi-wavelength high-speed observations are essential to understand the underlying physics of the accretion process in the sub-second range. To study what causes these sudden outbursts, the variability scales in the different wavelengths and the changes in the geometry of the emitting zone we propose anticipated observations of 6 outbursts with NICER, strictly simultaneous with ground-based optical follow-up. We will make extensive use of the new OPTICAM triple-band optical instrument, of which we are developers and we already have 14 nights of guaranteed observing time. Observations with optical telescopes to which our team have access will also take place.

Prop #	Title	PI Name	Abstract
4152	ILLUMINATING THE ACCRETION DISK-CORONAE OF BLACK HOLES DURING THEIR FADING PHASE WITH NICER	NAVIN SRIDHAR	We request 40 ks of NICER and 60 ks of NuSTAR time to trigger ToO observations to obtain high signal-to-noise spectra from the relatively under-explored fading phases of a non-failed outburst of transient black hole. Our principal goal is to track the evolving properties of the accretion-corona system viz., inner disk truncation, disk density, coronal geometry, and disk inclination as the outburst enters the returning hard-intermediate to quiescent-hard state. This will be achieved with a suite of relativistic reflection and reverberation models to investigate the implications of accretion physics on the origin of hysteresis in the hardness-intensity diagram.
4154	NICER CHARACTERISATION OF OUTBURST REFLARES IN LMXBS	ARIANNA ALBAYATI	Reflaring events have been seen to occur after the outbursts of LMXBs. They are several orders of magnitude fainter than the main outburst, and each last from a few days to up to two months. These reflares are observed only for some sources and, in the same source, only for some outbursts. NICER has recently allowed for the first detailed spectral studies of reflares, uncovering full state transitions which exhibit hysteresis loops, one of which was in an unusual clockwise direction. However, the cause of reflaring, and why there is such variety in their manifestation, is still unknown. To explore this, we propose to observe the next source which shows reflares at the end of the outburst every other day for a total of 120 ksec with NICER to follow the reflare's evolution.
4155	THE PROPERTIES AND EVOLUTION OF ACCRETION DISKS IN BLACK HOLE BINARIES	RILEY CONNORS	We propose simultaneous NICER and NuSTAR ToO observations of any one of the 19 listed transient black hole X-ray binaries. We request a total of 8 ks of NICER time, split into four 2 ks exposures, each simultaneous with a 20 ks NuSTAR exposure (total of 80 ks NuSTAR time), and each spaced about a week apart.

Prop #	Title	PI Name	Abstract
4156	IDENTIFYING NEWBORN COMPACT OBJECTS IN FAST, BLUE OPTICAL TRANSIENTS USING NICER'S SUPERIOR TIMING OBSERVATIONS	DHEERAJ PASHAM	NICER has recently identified a ~225 Hz quasi-periodic oscillation (QPO) from the fast, blue optical transient (FBOT) AT2018cow. This has been interpreted as a signature of fallback accretion onto a new born compact object in a supernova. Following this success we are proposing for high-cadence monitoring observations of a new FBOT in cycle 3. Our main goals are to 1) identify a similar QPO in a future FBOT, 2) search for coherent pulsations, and 3) study the evolution of such a signal with time, dependence on source luminosity and multi-wavelength properties. Identifying more such systems has the potential to open up a new area of science of study of compact objects right at birth. The key to this program is high time resolution in X-rays and currently only NICER has such a capability.
4158	NICER OBSERVATIONS OF THE FIRST ECLIPSING ACCRETING MILLISECOND X-RAY PULSAR SWIFT J1749.4 2807	ARIANNA ALBAYATI	SWIFT J1749.4 2807 is the 13th discovered of over 20 AMXPs, and is the only AMXP to be found in an eclipsing system. Using the mass function of the system and the eclipse half-angle, it is possible to constrain the inclination of the system within the 74.4-77.3 deg range. This is the tightest constraint on the orbital inclination of any AMXP to date. SWIFT J1749.4 2807 also shows uncommonly strong harmonic content that, together with the inclination, suggests that it might be the best source to set constraints on neutron star properties including compactness and geometry. To explore this, we propose to observe the next outburst of SWIFT J1749.4 2807 with 120 ksec of NICER observations. We will perform combined timing and spectral study of this source using the unique capabilities of NICER
4159	A NICER-TESS SYNERGISTIC LOOK AT QPOS IN AGN: RE J1034+396	KRISTA SMITH	Quasi-periodic oscillations (QPOs) are potentially valuable tools for studying accretion disks, general relativity, and the environments around black holes. Despite proliferating theories, however, their physical origin is still unknown. Although common in the X-ray light curves of stellar mass black holes, only a handful have been observed in AGN. The discovery of an optical QPO in a Kepler AGN light curve and promising indications of QPOs in TESS data for two AGN with known powerful X-ray QPOs have begun addressing this discrepancy, with important implications for accretion physics. In this proposal, we request NICER monitoring of an AGN with a high-significance X-ray QPO to occur during upcoming TESS monitoring, to provide complementary insight into QPO phenomenon.

Prop #	Title	PI Name	Abstract
4162	AN EXTRAGALACTIC OLD FAITHFUL: UNCOVERING THE NATURE OF ASASSN-14KO S PERIODIC FLARES	ANNA PAYNE	ESO 253-G003/ASASSN-14ko is a highly unique AGN that undergoes periodic flares every ~114 days with a negative, non-zero period derivative. There were 17 outbursts detected in V-/g-band ASAS-SN survey data during the last six years, with missing outbursts due only to seasonal gaps. Numerous flaring events are highly unusual for an AGN, which normally vary at a low-level following a damped random walk model. The precise origin of these flares remains unknown but this could be the first example of a repeating partial tidal disruption event (TDE). We propose to obtain NICER observations of three upcoming outbursts, which will be complemented by UV/optical monitoring, in order to fully characterize the X-ray evolution during the flares and compare the emission between flares over time.
4163	BROADBAND SPECTRA OF THE ULTRA-COMPACT X-RAY BINARY 4U 1820-30	JEROEN HOMAN	The modeling of neutron-star LMXB X-ray spectra often suffers from a lack of coverage at either the low or high energy end. NICER spectra offer great low-energy coverage, with the potential to obtain excellent constraints on the thermal components, including parameters such as the inner disk radius and size of the boundary layer. However, this still requires additional coverage above 10 keV. Here we request three 20 ks NICER/NuSTAR ToO observations of the ultra-compact neutron-star LMXB 4U 1820-30, a bright source with large spectral variations. The observations will be triggered to observe the source at select locations in its spectral range, with the goal of improving our understanding of the evolution of the various spectral components and the underlying changes in the accretion flow.
4172	OBTAINING A "NICER" SAMPLING OF THE VARIABLE X-RAY FLUX OF ZETA PUP	ALEXANDRE DAVID-URAZ	zeta Pup is a well-studied, archetypal O-type supergiant with more than one period of cyclical variability detected in multiwavelength studies. Previous Chandra and XMM-Newton observations have shown the presence of a 1.78-d period, believed to be linked to rotation, and another, longer unexplained period of around 5-6d. Monitoring this star with NICER using two separate observing cadences, we seek to probe both signals and their coherence timescales, as well as constrain the presence of possible additional stochastic variability. By combining this dataset with simultaneous BRITE space-based optical photometry, we will trace these signals back to the wind structures -- both large-scale and possibly small-scale -- that cause them, and gain a deeper understanding of the outflows of OB stars.

Prop #	Title	PI Name	Abstract
4173	X-RAY ENHANCEMENT DURING CRAB GIANT RADIO PULSES	WALID MAJID	We are proposing to carry out a sensitive and multi-wavelength search for correlations between X-ray and giant radio pulse emission from the Crab pulsar. A positive correlation will indicate coherent (radio) and incoherent (X-ray) emissions in the magnetosphere are linked and are likely originated from the same region in the magnetosphere of the star. Such a correlation would also suggest that both giant pulses and enhancement in the X-ray emission are linked to an increase in the electron-positron plasma density.
4175	CONTINUUM-FITTING SPIN MEASUREMENTS OF BRIGHT BLACK-HOLE TRANSIENTS	JAMES STEINER	After a black hole transient has reached the bright and soft thermal-dominant state, it undergoes a months-long gradual decline in the same thermal state. These data contain minimal contribution from the nonthermal Compton and reflection components and as such are the gold-standard for spin measurements via X-ray continuum fitting. To account for source evolution and to ensure we accrue sufficient data in the critical thin-disk regime, we request 10x2ks observations, each spaced apart by 2-4 weeks to monitor a (roughly) Crab-bright transient in decline. We request up to two triggers over the next cycle, for a maximum of 40ks.
4176	A NICER VIEW OF THE RADIATIVE LOSSES IN THE HIGH-MASS GAMMA-RAY BINARY PSR B1259-63	JOEL COLEY	We propose NICER observations of the Gamma-ray binary PSR B1259-63 simultaneous to guaranteed TESS and Swift spanning the TESS Sector 38 Timeframe. Consisting of a 48 ms pulsar and an O9.5 Ve star with a circumstellar disk inclined to the orbital plane, B1259 shows double-peaked emission at radio, X-ray and TeV energies as the pulsar crosses the Be disk along with powerful flares at GeV energies that at times exceeds the spin-down power of the pulsar. The GeV flares are delayed by 30-45 days and persist up to 90 days from periastron. Our goal is to monitor the evolution of the 1-10 keV spectrum to probe key physical properties of the termination shock and discriminate between the synchrotron or IC losses driving the strong GeV flares using a discrete cross-correlation function.

Prop #	Title	PI Name	Abstract
4179	SPECTRAL AND TEMPORAL STUDIES OF A NEW CATACLYSMIC VARIABLE DETECTED DURING THE SCAN PERIOD OF SPEKTR-RG MISSION	SOLEN BALMAN	We propose to observe a new X-ray source detected during the scan of the SRG mission for 40 ksec with NICER jointly with NuSTAR for 55 ksec. We have optically identified it to be most likely a magnetic cataclysmic variable. We plan to recover the white dwarf spin period, the orbital period and other sideband frequencies or QPOs to confirm the magnetic nature and characterize the X-ray spectrum (measuring temperature, flux, soft excess) over the wide energy range of 0.3-78 recovering emission lines and absorption components in the NICER energy band together with the 6-7 keV line complex and any Compton reflection component in the NuStar range. We will study orbit/spin phase-resolved spectra using NICER that will yield important details on accretion processes and geometry of the source.
4180	LOOKING FOR HEAVY ELEMENTS DURING THERMONUCLEAR BURSTS	JEROME CHENEVEZ	We propose to use the advanced energy and time resolutions of NICER to search for discrete spectral features during thermonuclear X-ray bursts from 4U 1820-30. During the strong bursts of this source, the photosphere of the neutron star can temporarily be lifted to large radii, ejecting nuclear burning ashes that can imprint the burst spectra. We aim, with the proposed observations, to double the number of bursts detected by NICER from this source. Stacking bursts together does significantly improve the detection of spectral lines, making it possible to track their energy through the burst evolution. By identifying lines related to heavy elements we can explain burst nucleosynthesis processes and probe the equation of state of the neutron star through the measured gravitational redshift.
4181	MEASURING BLACK HOLE SPIN AND MASS THROUGH X-RAY REFLECTION SPECTRA AND REVERBERATION LAGS	GUGLIELMO MASTROSERIO	X-ray reflection in accreting black holes probes the inner region of the accretion disc, and proper modeling of the spectral and timing properties of this emission enables measurement of the black hole mass and spin. The unique combination of NICER s soft and NuSTAR's hard coverage provide the broad bandpass, high count rates and energy and timing resolution required to constrain models of the time averaged energy spectrum and the reverberation lag energy spectrum on different timescales. We propose to observe any black hole transient, known or unknown, exceeding 30 mCrab during the bright hard state for 30 ks with simultaneous NICER and NuSTAR observation in order to access unprecedented characterization of black hole spin and mass.

Prop #	Title	PI Name	Abstract
4183	EXTREME VARIABILITY IN X-RAY BINARIES	DOUGLAS BUISSON	A few X-ray binaries show extreme rapid variability, by factors >200 within hundreds of seconds; these often have a very hard X-ray spectrum with strong structure around the iron line. This unusual state may be due to variable absorption or exceptional variation of the intrinsic strength of the primary emission. So far, only 4 examples have been observed. We propose NICER monitoring of further X-ray binaries which show this extreme flaring to find out more about this state and detect how transitions to other accretion states occur.
4186	NICER MEASUREMENTS OF THE INNER DISC RADIUS OF THE ACCRETION DISC IN BLACK HOLE X-RAY BINARIES	KEVIN JATIVA	The geometry of the accretion disc during the low/hard state (LHS) of black hole low-mass X-ray binaries (BH LMXBs) is still under debate. Although the standard models suggest a highly truncated accretion disc during the LHS, several studies have measured different levels of truncation for the inner disc radius. In order to study the truncation of the accretion disc, we propose to observe with NICER the next low-mass X-ray binary with low interstellar absorption on a daily basis. We propose to trigger the observations during the rise and the decay of the outburst while the source is in the LHS. We will explore the evolution of the inner disc radius by studying the properties of the disc emission.
4188	MONITORING THE NEXT OUTBURST OF IGR J17480-2446 (TERZAN 5 X--2): A LAB FOR STUDYING THERMONUCLEAR BURNING REGIMES	GIULIO MANCUSO	During its first and only outburst in 2010, the 11 Hz accreting pulsar IGR J17480-2446 became one of the most prolific X-ray bursters known to date, showing all type of bursting regimes, in qualitative agreement with theoretical models of thermonuclear burning, but showing also substantial deviations from them. Here we propose 240 ksec ToO observations to monitor the next outburst of the source. These observations will allow us to study, among others, the interaction between the accretion disk and the flux coming from the X-ray bursts; the spin-up evolution of the NS as a function of the accretion rate and the connection between the accretion rate and the marginally stable burning.

Prop #	Title	PI Name	Abstract
4189	A NICER SEARCH FOR SOFT X-RAY COUNTERPARTS OF ACTIVE REPEATING FAST RADIO BURST SOURCES	AARON PEARLMAN	Fast radio bursts (FRBs) are extragalactic pulses of radio emission, whose progenitor population is still unknown. Thus far, 22 extragalactic FRB sources have been found to produce repeat bursts. We propose to carry out a high time resolution search for X-ray bursts from 5 active repeating FRB sources with low dispersion measures in the soft X-ray band using NICER. We propose for a total of 150 ks of ToO observations with NICER, which will be coordinated with simultaneous radio observations with the Deep Space Network 70-m radio telescopes as part of an on-going FRB monitoring program. Each of our repeating FRB targets will be observed for a total of 30 ks using NICER, and we will trigger the observations when these repeating FRB sources become active in the radio band.
4190	MEASURING HMXB WINDS WITH NICER OBSERVATIONS OF CYG X-1 NEAR ORBITAL PHASE 0	MICHAEL NOWAK	Cyg X-1 is in a 5.6 day orbit around a High Mass X-ray Binary that donates mass to the black hole system via “focused wind accretion”. Near orbital phase 0, or line of sight to the inner accretion flow passes through this wind, and allows X-rays from the black hole to probe the wind's structure. Historically, we see “dips’" associated with both highly ionized absorption and colder, denser near neutral absorption. NICER, with its large effective area, superb soft X-ray response, and low background is uniquely suited to study this dipping behavior on time scales potentially as fast as 0.1 s. We will use modeling of light curves, time-dependent color-color diagrams, and spectra at different color/flux levels.
4192	LEGACY OBSERVATIONS OF ACCRETION DISK WINDS IN BHXRBS	NOEL CASTRO SEGURA	BHXRB viewed at high inclinations display wind signatures in their X-ray spectra. These features are the signatures of powerful, hot and equatorial accretion disk winds being driven from these systems in their luminous soft states. Remarkably, blue-shifted absorption lines have recently also been discovered in optical and NIR recombination lines. These features must also be produced in an outflow, but the physical conditions traced by these outflows are different. It is unclear if they are associated with driven by different mechanisms or simply with different regions/phases within the same outflow. We propose to answer this question by carrying out simultaneous time-resolved spectroscopy of the next black-hole transient in the X-ray and optical bands, throughout a full outburst.

Prop #	Title	PI Name	Abstract
4193	TRACKING THE SOFT EXCESS EMISSION ON VISCOUS TIME SCALES	ABDERAHMEN ZOGHBI	The soft excess is smooth spectral component that is observed ubiquitously in AGN. Its origin is not clear. Recent modeling suggests that relativistic reflection or Comptonization in warm corona both explain its spectral shape. We propose to monitor two sources PG 1404+226 and TON S180 to track how the soft excess varies relative to the primary power on time scales comparable to the viscous time scale at the inner accretion disk. The two sources have comparable masses, but very different strengths for the soft excess. Obtaining characteristic variability time scale and comparing how observable such the photon index and flux in different bands vary with time, will allow the models to be tested.
4194	COMPLETING THE CENSUS OF SPIN-POWERED MILLISECOND PULSARS WITH NICER	MEGAN DECESAR	Observations of rotation-powered millisecond pulsars (RMSPs) with NICER can be used to increasingly constrain the dense matter equation of state; to measure RMSP timing stability; and to study the X-ray emission mechanism and magnetic field geometry through radio/X-ray alignment and light curve modeling. NICER has discovered pulsations from 7 RMSPs, and re-detected pulsations from 9 others. Toward the goal of completing the census of X-ray RMSPs and thus expanding the dataset for these studies, we propose NICER pulsation searches in 3 RMSPs with X-ray counterparts. Among RMSPs with unpulsed X-ray counterparts, these 3 sources have the brightest X-ray fluxes (excluding Black Widows and Redbacks), making them the best targets for NICER pulsation searches in the RMSP sample.