Prop#	Title	PI	Abstract
3005	EROSITA FOLLOW-UP OF RARE AND DRAMATIC CHANGES IN AGN	MIRKO KRUMPE	eROSITA, successfully launched in mid-2019, will perform multiple all-sky X-ray surveys. Monitoring roughly half a million AGN/quasars, eROSITA will identify rare, accretion ignition/depletion events as they occur. We request 10 ToOs each with 20 ks to explore how the X-ray corona 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 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.
3006	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 our approved NICER Cycle 1 Target of Opportunity program to trigger on the next nearby binary recycled pulsar transformation to an accreting 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.
3015	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 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.
3017	RAPID MULTI-FREQUENCY VARIABILITY AND PARTICLE ACCELERATION IN BL LAC OBJECT 1ES 1959+65	ALAN MARSCHER	The extreme variability of nonthermal emission from blazars results from the rapid production of high-energy electrons in relativistic plasma jets. The particle acceleration mechanism can be probed through frequency-dependent variations of synchrotron emission of the highest-energy electrons in high-synchrotron-peak BL Lac objects. We propose to use simultaneous joint NICER, NuSTAR, and TESS monitoring observations of one such object, 1ES 1959+65, to determine the extent to which the soft-medium X-ray (NICER), medium-hard X-ray (NuSTAR in 3 bands), and optical (TESS) emission is co-spatial. The result will test particle acceleration scenarios that are uniform across the emission region versus those that involve shocks or turbulence.
3018	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 of the disk and the disk temperature. Particularly, 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 any 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.
3030	THE NATURE AND ACCRETION FLOW PROPERTIES OF SUB-LUMINOUS X-RAY BINARIES	JAKOB VAN DEN EIJNDEN	Very-faint X-ray transients undergo outbursts of accretion with a peak X-ray luminosity much lower than that of other black hole and neutron star low-mass X-ray binaries. Studying these objects is of great interest because they trace a poorly understood accretion regime and may represent neutron stars with relatively strong magnetic fields or a missing population of short-period binaries. To study the outburst of a known very-faint X-ray transient in detail, we propose 40 ks of NICER ToO monitoring observations, divided into 20 observations of 2 ks spanning two months. These observations will allow us to i) perform the first dedicated, multi-epoch timing study of a VFXT outburst and ii) monitor the spectral and flux evolution of the target.
3036	PULSAR MONITORING TO ENABLE GRAVITATIONAL WAVE SEARCHES	WYNN HO	We propose monitoring campaigns for five pulsars (PSR J0537-6910, J1101-6101, J1412+7922, J1849-0001, and J2229+6114), four of which can only be done via X-ray observations using NICER. These data will allow us to compute accurate phase-connected timing models for each pulsar, which will enable LIGO/Virgo to perform sensitive searches for gravitational waves from these young and potentially strong gravitational-wave sources. In order for our proposed observations to occur contemporaneously with LIGO/Virgo's observing runs, which take place from 2019 to mid-2020 and restarts in 2021, we request multi-year observations. Our high cadence observations of J0537-6910 will also provide an opportunity to further pin-down this pulsar's unique glitch predictability and to measure glitch signatures.

Prop#	Title	PI	Abstract
3041	THE SOFT X-RAY SPECTRUM OF A PRE-MAIN SEQUENCE PLANET HOST	PAUL CAULEY	Understanding the magnitude and timescale of planetary evaporation is critical to addressing the recent discovery of a gap in the radius distribution of super-Earth sized planets. V1298 Tau is a 23 million year old star that hosts four transiting Neptune and Jupiter sized planets. Its brightness, combined with the frequent transits, makes this a benchmark system for studying the atmospheres of very young planets and getting a grip on early evaporation rates. Estimates of mass loss, however, are highly dependent on the star's X-ray flux. We propose to use NICER to measure the soft X-ray spectrum of V1298 Tau in order to estimate the evaporation rates of the four transiting short-period planets. The spectrum will also be useful in modeling future observations of the planets' atmospheres.
3043	COMET DIAGNOSTICS OF THE SOLAR WIND	DENNIS BODEWITS	We will use NICER observations of two comets to characterize the composition of the solar wind during solar minimum and to use the comet as a natural laboratory to study CX emission. First, we will use two different comets as natural space probes to measure the velocity, composition, and freeze-in temperature of the solar wind (cf. Bodewits et al. 2004; 2007). Second, NICER s sensitivity allows us to investigate the emission features between 1 - 2 keV previously seen in comets.
3044	THE EVOLUTION OF PSR B0540-69	FRANCIS MARSHALL	In Dec. 2011, B0540-69, the most luminous gamma-ray pulsar known, transitioned to a previously unknown state with a 36% increase in spin-down rate and a large change in the braking index (n) from 2.1 to ~0, much smaller than for almost any other pulsar. The transition is likely due to a reconfiguration of the global magnetic field or currents. After the transition, first XRT and now NICER observations show that the pulsar remains in this new state with a slowly evolving n. NICER is by far the most efficient instrument to extend the ephemeris of B0540-69. We propose short observations to maintain a phase-connected ephemeris; search for a return to its old spin-down state; measure the evolving n; search for changes in the flux; and improve our understanding of this extraordinary pulsar.
3047	ORBITAL EVOLUTION OF ULTRACOMPACT WHITE DWARF BINARIES	TOD STROHMAYER	The ultracompact white dwarf systems HM Cnc and V407 Vul represent unique opportunities to probe binary evolution driven by gravitational radiation and mass transfer. Initial NICER observations have provided new, precise frequency measurements in both systems, and present constraints on the 2nd derivative of the orbital frequency for HM Cnc are beginning to become theoretically informative, and this will only improve as we extend the temporal baseline. The additional observations proposed here will do just that for each source, enabling new probes of their orbital evolution.
3050	THE EXTRAORDINARY GLITCH OF THE CCO PULSAR 1E 1207.4-5209	JULES HALPERN	We recently detected a glitch in the spin of 1E 1207.4-5209, the central compact object (CCO) in SNR PKS 1209-51/52. This is unprecedented for a pulsar with a spin-down rate as small as those found for CCOs, but it may support a timely conjecture that glitches could be triggered in CCOs by diffusion of a strong, buried internal field that rivals those found in magnetars, NSs with surface magnetic fields 10,000 times greater than the weak dipole fields inferred for CCOs. We propose to continue timing 1E 1207.4-5209, to monitor its post-glitch behavior and to obtain a sufficiently precise measurement of its new 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.
3053	COMPLETING THE TIMING CAMPAIGN FOR RX J0806.4-4123	BETTINA POSSELT	We propose the sixth NICER observation of RX J0806.4-4123 to complete the timing campaign started in Cycle 1. The goal is to obtain an accurate timing solution for this isolated neutron star. Previous constraints by XMM-Newton yielded a frequency derivative with a large uncertainty that is consistent with both spin-up or spin-down of the neutron star. A better constrained timing solution is needed because recent near-infrared observations discovered an extended source at the position of the neutron star which could indicate a circumpulsar disk. The proposed observations will allow us to test whether RX J0806.4-4123 has timing properties different from those of its siblings, the other six of the so-called Magnificent Seven.
3056	MAGNETIC ENERGY DISSIPATION OF MAGNETAR OUTBURSTS STUDIED VIA MULTI-WAVELENGTH FOLLOW-UP OBSERVATION	TERUAKI ENOTO	Magnetar outburst is believed to be sporadic magnetic energy dissipation at interior or outside the strongest magnets in the Universe. However, the physics underlying this dissipation process is still unclear. The NICER's large effective area provides the best sensitivity to trace change of soft X-ray pulse profiles during magnetar outbursts, which is crucial information of magnetic field configuration and dissipation. For example, the NICER PV observation detected multiple pulse peaks from activated 4U 0142+61 as evidence for multipole surface fields. During the GO1 program, we successfully recorded "single X-ray pulses" for the first time from the transient magnetar XTE J1810-197. Here, we propose 100-ks NICER follow-up ToO program for magnetar outbursts to invest

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3058	RELATIVISTIC REFLECTION AND REVERBERATION MAPPING IN A BLACK HOLE BINARY	JINGYI WANG	Black hole astrophysics is a fundamental tool in studying the accretion and ejection physics in the strongest gravity regime. The spectral technique reflection spectroscopy and timing technique reverberation mapping could reveal the geometry and properties of disk and corona in the innermost regions. With recent cutting-edge reverberation models, it is promising to settle the disk truncation controversy in the hard state, to track the corona outflowing velocity and reverberation lag behavior that indicates a changing coronal geometry, and to find more evidence for the hysteresis effect we previously see with NICER. The ultimate goal is to find clues on the state transition mechanism and the disk-corona-jet relation in black hole binaries.
3061	CONFIRMING THE NATURE OF THE WHITE DWARF CANDIDATE RX J0648.0-4418 WITH NICER	CHRISTIAN MALACARIA	RX J0648.0-4418 is a peculiar binary consisting of an X-ray pulsar, and a hot subdwarf of O spectral type in a circular orbit. With a dinamically measured mass of 1.28 +/-0.05 M_sun, the nature of the X-ray source is still under debate. It may represent one of the heaviest White Dwarfs known, and also the fastest spinning one. Otherwise, it could represent a very light Neutron Star, with puzzling X-ray properties. Fast spin-up from this object has also been measured recently, interpreted in terms of a young, contracting WD. Here we propose for a NICER investigation of this target to characterize its timing and spectral behaviour.
3065	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.
3066	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 two new occultations.
3067	CORRELATED RADIO/MM-X-RAY TIMING OF CYGNUS X-1	THOMAS MACCARONE	We propose to observe Cygnus X-1 with NICER simultaneously with 30 GHz observations with the Green Bank telescope. These data will provide a time lag for the 30 GHz emission from the X-ray emission, helping to understand the structure of the jet, following up on a previous result which indicates that either there is strong acceleration in the part of the jet from which the radio emission comes, or the size scale of the jet is not linearly proportional to the wavelength.
3072	THE EVOLUTION OF THE X-RAY REVERBERATION LAG IN GX 339-4 DURING STATE TRANSITION	BARBARA DE MARCO	We propose a ToO monitoring program (1 visit per day for 13 days, each visit having an on-source exposure of 6 ks during the first 10 days and 20 ks during the last 3 days) of the black hole X-ray binary GX 339-4, to study the evolution of the X-ray reverberation lag during the hard-to-soft state transition, and map variations of disc geometry. With this monitoring we aim to test predictions of truncated-disc models, whereby the lag should decrease throughout the transition, reaching the minimum value when the inner disc settles at the ISCO. GX 339-4 have recently shown increased activity associated with a possible new outburst. Should the source evolve throughout a complete outburst NICER will be able to monitor the transition and place constraints on the disc geometry.
3073	MONITORING OF A NEWLY DISCOVERED X-RAY BRIGHT TIDAL DISRUPTION EVENT 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 nearby, X-ray bright TDE as discovered or detected by the All-Sky Automated Survey for Supernovae (ASAS-SN). Complemented by ground based and space-based UV/optical observations, these observations will allow us to fully characterise the nature of the X-ray emission as it evolves.

Prop#	Title	PI	Abstract
3075	A NEW ECLIPSING LOW-MASS X-RAY BINARY WITH A GIANT COMPANION?	RYO SASAKI	We detected periodic X-ray eclipse from a low-mass X-ray binary 1RXS J175721.2-304405 with NICER. It shows a step-function like time variability observed with the X-ray satellite ASCA. NICER monitored it from September 2018 to February 2019. We made the light curve with NICER and ASCA light curves superposed to investigate the time variability, and then we preliminary identified a periodicity of about 14.5 (or 7.3) days. Since the long orbital period suggests a giant companion with a neutron star or a blackhole, 1RXS J175721.2-304405 is likely a new and rare eclipsing low-mass X-ray binary with a giant companion. Future follow-up observation with NICER will find the evidence of a periodic eclipse. we propose one month NICER monitoring (1 ksec x 29 visits).
3078	X-RAY SPECTROSCOPIC MONITOR OF CIR X-1 OVER ITS ENTIRE ORBITAL PHASE	MAYU TOMINAGA	Cir X-1 has established its unique position in the binary evolution as the youngest known star and compact object binary. The system is also known for its peculiar X-ray variability, which needs to be physically understood for deciphering information that the system remembers since its last SN explosion. We focus on the X-ray variability within an orbital cycle, which is made by an interplay of a few ruling physics. Spectroscopic monitor at a high cadence over an entire orbital phase is a key to disentangling these interplaying physics and putting the observed complexity into a physical context. We propose approximately 100 snapshots within a 16.6~day period with NICER, which is uniquely suited for its operational flexibility, a large effective area, and a moderate energy resolution.
3080	SEARCHING FOR ABSORPTION EDGES IN THE SPECTRUM OF A BRIGHT EDDINGTON-LIMITED X-RAY BURST	JEAN IN 'T ZAND	Our plan is to detect for the first time with a high-sensitive instrument a thermonuclear X-ray burst from the nearby ultracompact X-ray binary 4U 1812-12, from which it is known that all bursts are Eddington-limited and have a high level of convection to dredge up heavy ashes, and search for absorption edges in the burst spectrum. As a bonus, we can search for burst oscillations for the first time in this persistent burster.
3082	NICER OBSERVATION OF GRS 1915+105-LIKE VARIABILITY IN A GALACTIC X-RAY BINARY	ARIANNA ALBAYATI	GRS 1915+105 is a BH LMXB that displays a wide and complex set of variability patterns in its X-ray flux over time. This behaviour was thought to be unique and driven by near-Eddington-limit accretion. Two further sources (IGR J17091-3624 and the Rapid Burster) have been seen to exhibit GRS 1915-like variability during outbursts, casting doubt on the requirements of Eddington-limited accretion or a black hole primary. As such, the mechanism through which this behaviour is generated remains unclear. We propose four 20ksec ToO observations (for a total of 80ksec) separated by ~2 weeks to observe any source that exhibits GRS-1915-like variability in AO2 in order to increase our sample size of GRS 1915-like objects, thus allowing us to better constrain models that explain their behaviour.
3085	INVESTIGATING 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.
3086	ENHANCED OBSERVATIONS OF THERMONUCLEAR BURSTS FROM 4U 1820-30	JEROME CHENEVEZ	We propose to use the advanced energy and time resolutions of NICER to search and identify ashes of thermonuclear burning during strong X-ray bursts from the neutron star in the ultra-compact low mass X-ray binary 4U 1820-30. Indeed, the released flux does temporarily drive the photosphere to large radii, ejecting nuclear burning ashes that can imprint the burst spectra. It has been proven that numerous bursts from this source observed with NICER can significantly improve the potential to measure several lines. A positive detection and identification of spectral features from a number of heavy elements will constrain the thermonuclear burning processes as well as the gravitational redshift from the neutron star.
3089	HUNTING FOR NON-THERMAL X-RAY EMISSION FROM A WHITE DWARF PULSAR	KAYA MORI	Among many magnetic CVs, AR Sco stands out as the only known white dwarf pulsar binary where its pulsed emission from the radio to UV bands is powered by synchrotron emission from relativistic electrons, instead of mass accretion. It is unclear whether its pulsed X-ray emission is non-thermal or an extension of the synchrotron radiation beyond the UV band. NICER will unambiguously determine the nature of the pulsed X-ray emission and measure its spectral parameters accurately. The proposed NICER observation offers a unique opportunity to probe how interactions between the magnetic white dwarf and its companion star can accelerate particles and emit high-energy radiation, as originally proposed by Goldreich and Lynden-Bell in 1969 for the Jupiter-Io system, outside the solar system.

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3090	SPECTRAL/TIMING STUDY OF RXJ0019.8+2156, A SURFACE-NUCLEAR-BURNING WHITE DWARF	RONALD REMILLARD	We propose to continue the study of temporal and spectral properties of RXJ0019+2156, a supersoft X-ray source associated with nuclear burning of accreted gas on the surface of a white dwarf. Our goals are to characterize the X-ray variability, to measure how the effecting radius changes with temperature and luminosity, to search for non-thermal continuum components, to conduct QPO searches at frequencies above 10mHz, and to search for X-ray lines that may be assoicated with the central source or the outflow. The NICER observations during the Prime Mission show progress for this study, but results are limited by the unexpected faintness of the source in late 2017 and the percentage of the exposures conducted in short intervals.
3091	WR 140, APPROACHING APASTRON	MICHAEL CORCORAN	Eccentric, massive colliding wind binaries provide unique laboratories to study how shocked astrophysical plasmas simultaneously produce X-ray emitting gas and form dust under well constrained density, mach number and temperature conditions as the separation of the stars changes. The best studied example of a colliding wind binary shock laboratory is WR 140, a long-period, highly eccentric massive evolved binary in which wind-wind interactions generate variable emission from the X-ray to radio bands along with the periodic formation of dust near periastron. We propose weekly monitoring of WR 140 with \nicer\ through Cycle 2 to study the X-ray spectrum as the stars head towards apastron and the shock stablizes.
3092	MONITORING THE EXTREME VARIABILITY IN SWIFT J1858.6-0814	DOUGLAS BUISSON	Swift J1858.6-0814 is a very unusual X-ray binary. It shows extreme rapid variability, by factors >200, and has a very hard X-ray spectrum with strong structure around the iron line. Strong signatures of winds have been observed in wavebands from IR to soft X-rays. Such an accretion state has only previously been seen in short outbursts of V404 Cyg and V4641 Sgr. Swift J1858.6-0814 is currently undergoing a prolonged outburst giving an unprecedented opportunity to study this unusual mode of accretion: we propose to continue the existing NICER monitoring to find out more about this mode and detect any transitions to other accretion states.
3098	CONTINUED TIMING OF MEV PULSARS PSR J1846-0258 AND J1838-0655	ALICE HARDING	We are proposing continuation of NICER timing of PSR J1846-0258 and J1838-0655 for a total of 123.5 ks to establish multi-year ephemerides and allow us to improve the significance of our detections of emission with Fermi GBM and LAT, to discriminate between pair creation models in pulsar magnetospheres, to understand weak or absent particle acceleration and glitches in MeV pulsars, to probe the pulsar-magnetar connection and to put tight constraints on continuous GW-emission. These pulsars are members of a group of young and energetic rotation-powered pulsars that are both radio and GeV quiet, and therefore must be monitored in X-rays to understand their high-energy spectrum and enigmatic nature. Our A01 timing has already allowed firm pulsed detections up to 300 keV with GBM NaI.
3099	UNDERSTANDING THE CONNECTION BETWEEN THE X-RAY CORONA AND THE NUCLEAR RADIO EMISSION IN AGN	CLAUDIO RICCI	We propose here a joint study of the mm/X-ray variability of the brightest unobscured AGN in the southern sky, IC 4329A. We will use NICER and ALMA to monitor this source, observing it for 2 ks twice per day over ten consecutive days. The ALMA monitoring has already been approved (priority A). This would be the first time such monitoring is carried out with such a high resolution in the mm band (~20 pc), and the detection of correlated mm/X-ray variability would be crucial proof of the coronal origin of the nuclear radio emission in radio-quiet AGN. These observations would also be fundamental to understand the origin of the X-ray emission, proving, for the first time, that the X-ray corona is magnetically-heated.
3100	MULTI-WAVELENGTH STUDY OF THE FAST FLARING PROPERTIES OF BLACK-HOLE X-RAY BINARIES	GEORGIOS VASILOPOULOS	These observations will be coordinated with high-speed optical photometry observations obtained with the CHIMERA instrument mounted on the Palomar 200" Hale telescope. By obtaining simultaneous X-ray and optical light-curves we can study variability at time scales from a few seconds to a few minutes that is associated with jet or disk emission. The goal of our exploratory study is to observe X-ray active binaries like V404 Cyg or Swift J1858.6-0814, in an effort to shed light into their peculiar flare phenomenology.
3102	A HIGH-CADENCE NICER INVESTIGATION OF WARPED ACCRETION DISK PRECESSION IN THE X-RAY PULSAR HER X-1	MCKINLEY BRUMBACK	We request 15 NICER observations of exposure 2 ks each (total exposure of 30 ks) of the low mass X-ray binary Her X-1 during the main-on phase of its 35 day superorbital cycle. NICER's high throughput, timing resolution, and lack of pile up will allow us to observe the 10 day bright main-on phase with excellent statistics and high observing cadence. We will observe changes in the soft pulse profile and model these changes using an irradiated warped disk model. With these observations we will place strong constraints on the geometry of the accretion disk and will also probe the assumption that disk precession smoothly modulates the soft pulse profiles for the first time, revealing important information about the kinematics of disk structures in accreting compact objects.

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3103	NICER CHARACTERIZATION OF OUTBURST REFLARES IN LMXBS	VIRGINIA CUNEO	Low-mass X-ray binaries (LMXBs) are systems that go through eventual outburst phases, defined by an increased accretion rate. During the decaying phase of the outburst, sometimes the accretion rate rises again and the source exhibits one or more reflares, at X-ray luminosities fainter than the main outburst. It is believed that reflares are small-scale outbursts, however it is still unknown what is the mechanism triggering them. Given the reflare's faintness and the instrumental limitations, to date there are few studies of their properties and evolution. We propose to use NICER to monitor a LMXB exhibiting reflares in order to analyze their possible origin, to address how the mechanisms driven them work and to set them in the context of the general accretion process.
3104	UNDERSTANDING ACCRETION DISKS IN ULTRA-COMPACT X-RAY BINARIES	RENEE LUDLAM	Ultra-compact X-ray binaries (UCXBs) are a subclass of low-mass X-ray binaries that contain a degenerate stellar companion in a short orbit (< 80 mins). The accretion disk in these systems differ in chemical composition from typical LMXBs due to a lack of hydrogen and overabundance of higher Z elements. These systems exhibit multiple emission lines in their reflection spectrum from O and Fe. These multiple emission features offer the opportunity to learn more about the properties of the compact object and accretion disks in these systems. We request 10 ks NICER observations and joint 30 ks NuSTAR observations of two UCXBs to reveal the entire reflection spectrum from low-E oxygen features to the Compton hump at higher energy to enhance our understanding of accretion in these systems.
3107	THE "OBSCURED" STATE: WINDS AND THE END 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 23 years of monitoring, NICER has detected a huge change in this iconic source: the X-ray flux has dropped by 100x! Is this the approach to quiescence? 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 request 3x25 ks NuSTAR to constrain scattering and wind photoionziation. These observations will also continue to grow our NICER legacy archive of variability in GRS 1915+105.
3109	MONITORING THE EVOLVING THERMAL DISK EMISSION OF LMC X-3	JAMES STEINER	Building upon a pilot pre-GO phase program, we propose for monthly monitoring of LMC X-3, the softest, most highly-variable, and least absorbed of the persistent black hole X-ray binaries in the sky. Our goal is to empirically determine changes in disk structure as the accretion disk evolves from thin to "slim" when the disk approaches the Eddington limit. We demonstrate that LMC X-3 is uniquely suitable to disk continuum science, and that NICER is the most capable X-ray instrument for the science at hand.
3112	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-2 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 if the pulsations are continuing to decay, and if so what the exact rate of the decay is. The apparent slow decay of the pulse amplitude likely originates in the decay of the stellar magnetic field, such that measuring the rate of the decay will provide valuable guidance to the theoretical efforts trying to model the stellar magnetosphere and its long-term evolution.
3113	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 (BH) 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 9 individual anticipated ToO observations on ~2-3 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.

Prop#	Title	PI	Abstract
3114	COMPLETING THE CENSUS OF ROTATION-POWERED MSPS WITH NICER	PAUL RAY	NICER is highly optimized for the study of X-ray emission from rotation-powered millisecond pulsars (RMSPs). The goal of this proposal is to fully exploit this capability by completing the census of RMSPs with NICER, giving us a uniform view of the population and expanding it if possible. Looking at the population as a whole will give us insight into the mechanisms driving the X-ray emission and the geometry of the magnetic fields and hot spots on the surface. To accomplish this we will observe the two MSPs with claimed X-ray pulsations that NICER has yet to confirm (PSRs B1957+21 and J1024-0719), as well as three MSPs that are promising targets for X-ray pulsations but have not yet been observed with NICER (PSRs J0101-6422, J0711-6830, and J0605+3757).
3115	TIMING TWO ERUPTING SUPERSOFT X-RAY SOURCES	MARINA ORIO	We propose to observe a nova in outburst and a flaring nova-like system in the Large Magellanic Cloud, both nuclear burning white dwarfs and very luminous supersoft X-ray sources. Our main aim is to measure pulsations with time scales of a minute, detected in other supersoft sources. The nova-like RX J0513.9-6951 has been observed before, but the timing analysis was not conclusive for short periods. For it and for the next luminous nova, we need good data with high S/N. Together with the results of three previous NICER targets, and with our accompanying proposal on the nuclear burning symbiotic SMC 3, these data will allow connecting the intriguing short time pulsations with binary physical parameters, giving insight on the root cause of the quasi-periodic variability.
3116	NICER OBSERVATIONS OF THE FIRST ECLIPSING ACCRETING MILLISECOND X-RAY PULSAR SWIFT J1749.4 2807	DIEGO ALTAMIRANO	Swift J1749.4 2807 is the 13th discovered of a total of more than 20 accreting millisecond X- ray pulsars (AMXPs), and most importantly, it is the first and 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 to be in the 74.4 77.3 deg range. To date, this is the tightest constrain on the orbital inclination of any AMXP. Swift J1749.4 2807 also shows uncommonly strong harmonic content that, together with the known inclination, suggests that it might be the best source to date to set constraints on neutron star properties including compactness and geometry.
3121	EXPLORING THE NATURE OF THE PROLONGED OFF STATE OF NGC 300 ULX1	GEORGIOS VASILOPOULOS	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.
3122	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 glitches and revealing their relative strengths and recovery times, identifying new spin-down glitch events, and revealing magnetars burst and outburst activity. In the process, we will also refine our knowledge on magnetars variability and the correlations between the spectral and temporal properties in quiescence and in outburst.
3123	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.
3125	X-RAY OBSERVATIONS DURING THE PREDICTED SELF-LENSING FLARE OF A PECULIAR AGN	DANIEL D'ORAZIO	The Kepler-observed AGN dubbed "Spikey" exhibits a sawtooth-like oscillation over three years with a 10-day-duration symmetric flare at the center of the steep rising portion of this oscillation. This lightcurve can be exquisitely, and uniquely, modeled by gravitationally self-lensed and Doppler-boosted emission from an accreting eccentric supermassive black hole binary (SBHB) at the heart of Spikey. If the SBHB hypothesis is correct, the sawtooth oscillation and symmetric flare will repeat in the coming year. As the lensing flare is most prominent in the X-ray and short in duration, we propose Nicer observations to be triggered if optical monitoring provides indication for flaring activity. Detection of an X-ray flare will provide definitive evidence for a sub-pc separation SBHB.

Prop#	Title	PI	Abstract
3126	JOINT NICER, NUSTAR, AND EVENT HORIZON TELESCOPE OBSERVATIONS OF 3C 273 AND 3C 279	MICHAEL NOWAK	The Event Horizon Telescope (EHT) is effectively an Earth-sized, interferometric mm-band telescope array with 20 muas spatial resolution that is conducting ground-breaking observations of supermassive black hole (SMBH) systems. The mm emission size resolved by EHT in SMBH are consistent with those inferred from X-ray and gamma-ray variability studies. We propose joint NICER/NuSTAR observations of two blazars during the Spring 2020 EHT campaign: 3C 273 and 3C 279. The former is an EHT target, and the latter is a calibrator for M87 observations. NICER will provide large effective area, low background, and rapid timing capabilities in the soft X-ray, and the joint spectra will span 0.1-70 keV. These blazars have shown both long term and short term flaring variability.
3127	THE HIGH-ENERGY EMISSION OF THE DOUBLY-MAGNETIC MASSIVE BINARY EPSILON LUPI	VERONIQUE PETIT	It is now established that 1 in every 10 massive stars on the main sequence hosts a strong magnetic field at its surface, whose true origin is still unknown. Interestingly, only 1 in every 50 stars in close binary systems is magnetic. Although rare, known magnetic binary systems are very important laboratories for investigating the impact of tidal and magnetospheric interactions on the evolution of magnetic fields, and their potential ties to the origin of stellar magnetism. This proposal focuses on the binary system eps Lupi, which contains two magnetic stars in close orbit. As their magnetic fields are expected to be tangled together, we aim to test whether magnetospheric interactions occur for hot, magnetic massive stars, by looking for enhanced X-ray emission at periastron.
3130	NICER AND MULTI-WAVELENGTH MONITORING OF AN DWARF-NOVA OUTBURST INCLUDING REBRIGHTENING	MARIKO KIMURA	Although accretion physics in dwarf novae have been well investigated for long time, rebrightening just after an outburst in WZ Sge stars or AM CVn stars cannot be explained by classical picture. The recent studies suggest that a part of the disk remains hot even after the main outburst, which would easily trigger additional brightening just after the main outburst. We can investigate whether this hypothesis is correct by multi-wavelength spectral and timing analyses, once we will obtain the data of an outburst including rebrightening. Here we propose 60-days daily NICER monitoring (2-ks x 60 visits) of an outburst in a WZ Sge star or an AM CVn star as a ToO, which is coordinated by optical and near-infrared observations.
3131	A NICER-TESS SYNERGISTIC LOOK AT AN AGN HIGH FREQUENCY QPO	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. Bolstered by the discovery of an optical QPO in a Kepler AGN light curve, we have obtained TESS short-cadence monitoring for two AGN with known powerful X-ray QPOs. In this proposal, we request NICER monitoring of one of these AGN to occur simultaneously with TESS, to provide vital complementary insights into the nature of the quasiperiodic phenomenon and causality in the AGN central engine.
3134	SPECTRO-TEMPORAL OBSERVATIONS OF TWO INTERMEDIATE POLARS	DEMOSTHENES KAZANAS	We propose NICER observations of FO Aqr and TV Col, two intermediate polars (IP). Virtually this entire class has count rates that peak at ~1 keV making them ideal candidates NICER observations. Our goal is to determine the geometry and physical parameters of the accretion flows of these sources from their accretion column impinging on the white dwarf to their Alfven radius and accretion disks, employing a combined spectal-temporal analysis of the data. Emphasis will be placed on the accretion flow properties that determine the spectra at E < 1 keV, whose character has been elusive to date. With knowledge of the flow structure we will model the opacity of this regime with photoionization employing models we have used in our previous work on AGN and X-ray binaries.
3135	EXPLORING FAST X-RAY/OPTICAL VARIABILITY IN NEUTRON STAR 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 increase our understanding of the underlying physics of the accretion process in the sub-second range. In order to understand what causes these sudden outbursts, the scales of variability in the different wavelengths, the physics of the plasma, as well as the changes in the geometry of the emitting zone, we propose anticipated observations of 4 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.

Prop#	Title	PI	Abstract
3137	ON THE SPIN-PERIOD DERIVATIVE & OTHER STORIES IN PULSATING ULTRA-LUMINOUS X-RAY SOURCES	CHRISTIAN MALACARIA	Pulsating Ultra-Luminous X-ray sources (PULXs) are a recently discovered class of sources in which a pulsating Neutron Star (NS) is radiating well above the isotropic Eddington luminosity. Their high spin-up rates make them perfect targets for testbeds of accretion models and and accretion-driven spin-up in NSs, plus NS interior structure study. Moreover, pulsations in this class of objects is transient, and deserves dedicated observations in order to sample and study hysteresis behaviour in which similar flux levels show very different pulsed fractions. We identified three PULXs that are particularly well suited for such studies. Thanks to its high large effective area and our flexible observing plan, NICER will allow to meet our objectives within relatively short exposure times.
3138	CONSTRAINING THE EVOLUTION OF THE GEOMETRY OF THE UNSTABLE WARPED ACCRETION DISC IN SMC X-1	MCKINLEY BRUMBACK	We request 100 ks of NICER observations of the high mass X-ray binary SMC X-1 to investigate and model changes in accretion structure with super-orbital cycle. SMC X-1 displays quasi-periodic super-orbital modulation, likely because of instabilities in the warped accretion disc. We propose to study the variable structure of the inner disc using four NICER observations of 25 ks each during the high state of different super-orbital cycles. We will perform phase-resolved spectral analysis and a principal component analysis to determine the origin of variations in the soft X-ray emission and use a simple warped disc model to constrain the changes in accretion and disc geometry. This work will probe the effect of the variable disc on the accretion structure in SMC X-1 with unprecedented detail.
3139	TOO OBSERVATIONS TO CONSTRAIN THE SPINS OF SUPERMASSIVE BLACK HOLES IN TIDAL DISRUPTION EVENTS	DHEERAJ PASHAM	We propose ToO monitoring observations (twice a day for 75 days) of a newly discovered tidal disruption event (TDE) in order to constrain its supermassive black hole's (SMBH) spin. Numerical studies suggest that the newly formed accretion disks in TDEs will be misaligned and will precess due to torques induced by the Lense-Thirring effect (frame-dragging). The disk precession period should be observable in X-rays and is a direct function of the black hole s spin. This novel technique to constrain spins of SMBHs relies on high-cadence X-ray observations. NICER s combination of fast maneuvering capability and large effective area makes it not only ideal but the only X-ray telescope that can track the X-ray spectrum precisely and disentangle the flux from the disk on a sub-day timescale.
3142	UNDERSTANDING HYSTERESIS IN BLACK HOLE STATE TRANSITIONS USING HIGHER ORDER STATISTICS	KAVITHA ARUR	Black Hole X-ray binaries regularly show transitions from a power law dominated hard state to a blackbody dominated soft state, and back again. However, these transition do not occur at the same luminosity, with the hard to soft transition occurring at luminosities that are a factor of few higher than the soft to hard state transition. Recent higher order analysis of black hole X-ray binaries over the course of outbursts have shown some evidence that the non-linear properties during these two phases of the outburst are different. We propose ToO observations consisting of 10 NICER observations of 2.5ks each, covering two different stages of the outburst, which will provide valuable insight into the origin of this hysteresis.
3144	THE POWER OF SPACE: SIMULTANEOUS X-RAY AND UV MONITORING OF ACCRETING LOW-MASS STARS	HANS GUENTHER	Young stars are surrounded by proto-planetary disks, the birthplaces of exoplanets, for the first few Myrs of their existence. Low-mass stars, called classical T Tauri stars (CTTS) in this phase, accrete mass from the inner rim of the disk. This accretion process causes emission from the X-ray to NIR. The UV component of this excess emission will be studied by a large HST DDT program called ULLYSES which includes spectroscopic monitoring of four nearby low-mass stars. We propose contemporaneous NICER observations to identify correlations between X-ray emission from corona and accretion shock and FUV lines and continuum from reprocessed shock emission. Temporal correlations will allow us to identify which components are physically related.
3145	A BROADBAND STUDY OF A NEARBY ULX IN NGC 4190	HANNAH EARNSHAW	We propose to observe NGC 4190 ULX-1, one of the last remaining nearby ULXs without broad- band X-ray data and an excellent target for both NICER and NuSTAR due to its persistently high flux (>10^−12 ergs/s/cm2) and isolation from other X-ray sources. Quasi-simultaneous observations for 50 ks with NICER and 80 ks with NuSTAR will allow us to constrain the broadband spectrum of the source and to search for pulsations and other timing features in both the NICER and NuSTAR data, in one of the best available opportunities to grow the small sample of ULXs with sufficient data for in-depth timing analysis.

Prop#	Title	PI	Abstract
3146	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. 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 releases energy back into its environments after an ext
3148	SEARCHING FOR SOFT X-RAY PULSATIONS IN THE QUIESCENT LOW-MASS X-RAY BINARY INSIDE THE GLOBULAR CLUSTER M30	SEBASTIEN GUILLOT	Determining the equation of state of dense matter is a key question of modern nuclear physics and astrophysics. To achieve this goal, several methods involving observations of neutron stars (NSs) exist. One consists in the X-ray spectral analyses of NSs in qLMXBs. When located inside globular clusters, the distances to these sources is known well enough (~5-10%) that the NS radius can be measured precisely. One source of systematic error, however, may stem from the presence of (unmodeled) hot spots at the surface of the NS. These would create period pulsations in the X-ray flux. We propose here NICER observation of the qLMXB in the GC M30 because it shows significant evidence for surface hot spots, and because it is the most promising GC qLMXB target for soft X-ray pulsations searches.
3149	LONG-TERM SYSTEMATIC MONITORING OF HMXB PULSAR OAO 1657--415	PRAGATI PRADHAN	We propose to advance our understanding of stellar wind dynamics by performing first ever systematic monitoring of HMXB OAO 1657 415. With a NICER observation of 2 ks every alternate day spread uniformly at different orbital phases for 20 days (2 orbits) we will measure NH & equivalent width of its prominent iron Kalpha line at these orbital phases, thereby mapping clump distribution and characterizing them. By stacking these individual 2 ks spectra, we will also generate the first orbital phase-resolved spectra for the source and look for possible massive structures throughout its orbit. Finally, during this monitoring campaign, we will also investigate detailed changes in the morphology of pulse-profiles in each observation, all possible thanks to large effective area of NICER.
3150	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 binaries.
3151	NICER MONITORING OF ETA CARINAE AFTER THE 2020 PERIASTRON PASSAGE	DAVID ESPINOZA-GALEAS	We are requesting 104 ksec of observation time in NICER AO2 to monitor the X-ray emission from the super-luminous massive colliding wind binary ETA CARINAE through its next X-ray minimum and recovery. This proposal is the next step of monitoring campaign of X- ray telescopes started with RXTE, followed by Swift and continued by NICER through Cycle 1. The proposed NICER monitoring program in Cycle 2 will give us unprecedented observations to compare the changes during its X-ray recovery. We also request a NuSTAR observation to study the connections between the thermal emission and non-thermal emission by comparing the 30-50 keV X-ray spectrum with NICER soft X-ray spectra. Our proposed NICER program will also provide context for our approved CHANDRA ACIS observations.
3152	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 emerge from quiescence in X-rays. With our program we 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.
3154	THE NATURE OF THE X-RAYS IN TW HYA: CONSTRAINING THE STELLAR CORONA WITH NICER	MARK REYNOLDS	The nature of the X-ray emission from a young accreting star plays a key role in its growth. The X-ray emission of these stars has been postulated to come from the accretion shock on the stellar surface, in addition to the stellar corona. Herein, we propose to use NICER to probe the relationship between these variable X-ray components in the proto-type T-Tauri star TW Hya.

Prop#	Title	PI	Abstract
3155	PROMPT NICER AND NUSTAR STUDY OF MAGNETAR OUTBURSTS	ALICE BORGHESE	Magnetars are a small class of 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 (50 ks) and NuSTAR (110 ks) ToO program (1 trigger of 4 observations over a few months) aimed at gathering new physical insights on magnetars surface and crust, magnetic field configuration and magnetospheres.
3157	SOFT X-RAY OBSERVATIONS OF X-RAY BURSTS FROM SELECTED LOW MASS X-RAY BINARIES WITH NICER	TOLGA GUVER	We propose NICER observations of low mass X-ray binaries, 4U 1608-52, Aql X-1, and 4U 1735-44 that show thermonuclear X-ray bursts, for 80~ks each. NICER provides the largest effective area in the soft X-rays, which allow for time resolved spectral and temporal analysis of the evolution of bursts. Initial observations of these events in the soft X-rays, showed that unlike the previous assumption time resolved X-ray spectra of X-ray bursts often can not be fit with simple Planckian functions and often require a second component whose nature is not really understood well yet, although assumed to be due to reflection off the accretion disk. We plan to observe sources with relatively low hydrogen column density to fully investigate their soft components.
3158	A NICER SEARCH FOR SOFT X-RAY BURSTS FROM REPEATING FAST RADIO BURST SOURCES	AARON PEARLMAN	Fast radio bursts (FRBs) are millisecond-duration pulses of radio emission that originate from an unidentified population of extragalactic sources. Thus far, 11 FRB sources have been found to produce repeat bursts. We propose to carry out a high-time resolution search for X-ray bursts from localized repeating FRB sources in the soft X-ray band using NICER. As of September 2019, FRB 121102 has entered an active state where multiple radio bursts have been detected. We propose for 50 ks of NICER observations of FRB 121102, coordinated with radio observations with the Deep Space Network 70 m telescopes as part of an on-going FRB monitoring program. We also request an additional 50 ks of NICER observing time for ToO joint radio/X-ray follow-up observations of other active repeating FRBs.
3160	MULTIWAVELENGTH OBSERVATIONS OF HIGHLY ACTIVE M DWARFS	RISHI PAUDEL	M dwarfs are the most abundant stars and frequently host planets. However, they are magnetically active and produce strong flares. Understanding the M dwarf flares is very important in identifying the habitable planets orbiting them. We propose to obtain NICER data of six active M dwarf flare stars which will be observed simultaneously with TESS and ground based telescopes. The results of this project will enable us to measure flare energy equipartition and compare to those obtained for Solar flares; model and estimate the impacts of strong flares on the atmospheres of planets orbiting M dwarfs. In this way, this project will provide crucial details in building a comprehensive picture of M dwarf activity, enabling us to identify where habitable planets might reside.
3161	MONITORING THE DECAY OF XTE J1810-197	ERIC GOTTHELF	Two days following reports of an outburst from the transient anomalous X-ray pulsar (AXP) XTE J1810-197, we obtained a NuSTAR DDT observation to characterize its outburst properties. Thus, 15 years after the 2003 discovery of this, the first known transient and radio AXP, it is possible to study the origin and decay of magnetar emission in exquisite detail from the beginning of the outburst in a uniquely accessible source. We propose here to continue our NICER monitoring of XTE J1810-197 to follow its X-ray spectral and pulsed evolution, measuring its surface thermal hot spots and magnetic field configuration, to compare with the original outburst at a similar epochs.
3162	GX 5-1 AS A PROBE OF THE ISM: A CASE FOR JOINT NICER OBSERVATIONS	MICHAEL NOWAK	We have an already approved joint Chandra-HETG/NuSTAR program to study the Si edge region structure (a probe of both the ISM and the local dust environment of the source) in conjunction with the broad band continuum. Here we request the addition of NICER observations to improve our knowledge of the source's location along its Z-track, via both spectra and timing signatures, and to improve our soft X-ray coverage. Furthermore, we can use these joint observations to improve the knowledge of the NICER calibration in the 1-3 keV region, without interference from the known dust halo. Our Chandra observations will spatially resolve out contamination from the known dust halo.
3163	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.

Prop#	Title	PI	Abstract
3164	EXPLORING EVOLVING MAGNETIC ACTIVITY OF YOUNG SUNS WITH NICER	VLADIMIR AIRAPETIAN	We propose NICER observations of a carefully selected sample of young solar analogs to focus on a single question with fundamental importance to search for life: What is the level of stellar activity in young sun-like stars and how does it impact habitability on rocky planets in the solar/stellar neighborhood? We propose to address this question by observationally characterizing and constraining magnetic activity in solar-type stars at various phases of their evolution. The proposed NICER observations are part of a large multi-wavelength, multi-observatory campaign where the complete data set will allow us theoretically reconstruct space weather properties including coronal X-ray-EUV and electromechanical fluxes from winds of solar analogs with ages spanning between 0.13 to 2.5 Gyr.