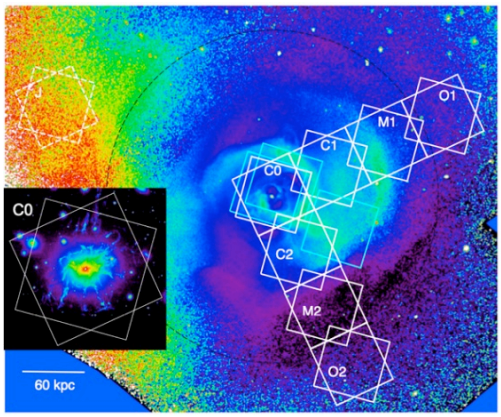
Perseus Cluster

Observation plan

"A" pointings: 4 in total, 280 ks in total
C0: (RA, Dec) = (03 19 47.76, +41 30 46.8), 50 ks
C1: (RA, Dec) = (03 19 33.36, +41 32 02.4), 50 ks
M1: (RA, Dec) = (03 19 18.96, +41 33 14.4), 80 ks
O1: (RA, Dec) = (03 19 04.08, +41 34 33.6), 100 ks
"B" pointings: 1 in total, 220 ks in total
C0: (RA, Dec) = (03 19 47.76, +41 30 46.8), 200 ks
If the primary goal for Virgo/M87 is achieved without the SW pointing, the SW pointing exposure will be used to observe C0 for 200 ks as "A".
"C" pointings: 3 in total, 280 ks in total
C2: (RA, Dec) = (03 19 41.04, +41 28 01.2), 50 ks
M2: (RA, Dec) = (03 19 34.56, +41 25 19.2), 80 ks
O2: (RA, Dec) = (03 19 27.6, +41 22 37.2), 150 ks.



Immediate objectives

"A" pointings

[1] C0, C1: measure turbulent velocity broadening and line of sight velocity of gas motions in a region affected by the AGN feedback physics. Probe potential velocity gradient in the direction of the rising NW bubble.
[2] M1, O1: probe shear motions of the hot gas across a cold front
[3] C0, C1, M1, O1: measure radial profile of velocities of gas motions in ICM, probe a transition from feedback-dominated to merger-dominated regions, compare with predictions from cosmological simulations of large-scale structure
[4] C0, C1, M1, O1: measure radial metallicity profile and put tight constraints on enrichment mechanisms (SNcc vs. SNIa)
[5] C0, C1: detect rare elements (Na, Al)
[6] C0, C1, M1, O1: reveal the role of turbulence in accelerating cosmic rays by searching correlation between measured velocity amplitude and strength of radio emission
[7] C0: probe physics of central AGN, including its variability, constrain changes from Hitomi
[8] C0, C1, M1, O1: calibrate statistical relation between the amplitude of density fluctuations and velocity

"B" pointings

[1] C0: detection of charge exchange
[2] C0: resonant scattering studies, constraints on the anisotropy of gas motions
[3] C0: probe different temperature, density and velocity components of the gas resulting from cooling and mixing with ambient gas
[4] C0: explore non-gaussianity of the strong iron lines
[5] C0: search for unknown physics
[6] C0: probe physics of central AGN, including its variability, constrain changes from Hitomi (in case 50 ks is not enough, depends on the current flux and equivalent width of the Fe-Kα line)

"C" pointings

[1] C0-3, M1-2, O1-2: measure azimuthal variations of velocities and metallicities
[2] M2: probe velocities in a region with prominent eddies formed by Kelvin-Helmholtz instability, constrain gas viscosity
[3] C0-3, M1-2, O1-2: probe a signal at 3.5 keV line, distinguish between a narrow plasma line and a broad dark matter line