NICER GO Cycle 6 - List of Accepted Proposals

Prop #	Title	PI Name	Abstract
7001	DO ACCRETING MAGNETARS EXIST? THE ENIGMATIC CASE OF 4U 2206+54	PABLO REIG	The discovery of very slow pulsations (Pspin=5500s) solved the controversy on the nature of the compact object in the high-mass X-ray binary 4U 2206+54 but prompted new questions. According to spin evolutionary models in close binary systems, such slow pulsations and high spin-down rate -1.5 10^14 HZ/s require magnetic field strengths of the order of 10^14 G, that is, they require the system to harbor a magnetar. However, it is very unlikely that this spin-down rate is valid on the long term because it would drive the neutron star to a complete halt in about 300 yr. This proposal seeks to estimate the magnetic field strength through the neutron star spin evolution and investigate with unprecedented detail the low-energy spectrum of 4U 2206+54 to validate or not the polar cap scenario.
7002	TIMING THE EVOLUTION OF ULTRACOMPACT WHITE DWARF BINARIES	TOD STROHMAYER	Ultracompact white dwarf binaries are the most compact binary star systems known and can have orbital periods shorter than 5 minutes. Their evolution is influenced by the loss of angular momentum due to the emission of gravitational radiation, and they are highly anticipated targets for space-based gravitational wave detection. We propose to continue to monitor the soft X-ray pulsations from HM Cnc and V407 Vul, two ultracompact white dwarf binary systems. HM Cnc is the most compact binary star system presently known, and NICER monitoring has provided new insights into its binary evolution. Continued monitoring with NICER will enable detailed probes of binary evolution driven by gravitational radiation and direct impact accretion.
7008	MONITORING X-RAY PULSARS FOR THEIR GRAVITATIONAL WAVES	WYNN HO	We propose monitoring observations of four radio-quiet X-ray-only pulsars (and PSR B0540-69), each of which can only be done using NICER, with total Cycle 6 exposure times of 208 ks for PSR J0058-7218, 26 ks for PSR B0540-69, 84 ks for PSR J1412+7922, 90 ks for PSR J1811-1925, and 50 ks for PSR J1849-0001. These data allow computation of an accurate rotation phase-connected timing model for each pulsar, which enable the most sensitive gravitational wave searches of LIGO/Virgo/KAGRA data from these young, fast-spinning, and potentially strong gravitational-wave emitting pulsars. We request multi-cycle observations to ensure NICER data overlaps contemporaneously with the current gravitational wave observing run that goes through early 2025.

Prop #	Title	PI Name	Abstract
7011	IDENTIFYING NEWBORN COMPACT OBJECTS IN FAST, BLUE OPTICAL TRANSIENTS USING NICER'S SUPERIOR TIMING OBSERVATIONS	DHEERAJ PASHAM	NICER has recently identified a ~224 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 6. 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.
7012	MONITORING ACCRETING MILLISECOND X-RAY PULSARS IN OUTBURST	TOD STROHMAYER	Accreting millisecond X-ray pulsars (AMXPs) are tremendously useful laboratories for the study of neutron stars and accretion physics. These low-mass X-ray binaries (LMXBs) are typically transient systems, showing outbursts of X-ray emission that last from between a few days to a few weeks, while often remaining dormant for years to decades in between. We propose a 60 ks monitoring campaign of the next AMXP outburst, from either a known or new system. These data will enable precise measurements of the neutron star spin frequency and binary orbit ephemeris, and, for known systems, also probe the evolution in these quantities. This program takes advantage of NICER's unique capabilities for fast timing and flexible monitoring of these transient systems.
7013	IDENTIFICATION AND STUDY COSMOLOGICAL BLACK HOLES AS THEY TURN ON A RELATIVISTIC JET USING NICER MONITORING	DHEERAJ PASHAM	Following NICER's recent success in capturing the spectro-timing variability of the farthest tidal disruption event (TDE) to-date we propose ToO monitoring (10x250s per day for 10 days + 2ks per day for 20 days~65 ks) of a future relativistic TDE, i.e., a system with a newborn relativistic jet pointed directly along our line of sight. Our main goals are 1) to establish the relativistic nature of the future transient by measuring its luminosity and variability, and 2) combine NICER data with our approved multi-frequency radio data to perform multi-epoch spectral energy distribution modelings to shed light on the underlying jet physics. Our scientific goals require high-cadence monitoring for months and a large X-ray effective area making NICER the ideal facility for the proposed study.

Prop #	Title	PI Name	Abstract
7017	OBSERVING THE NEXT X-RAY BINARY - RADIO MILLISECOND PULSAR TRANSITION WITH NICER	SLAVKO BOGDANOV	Over the past decade, 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 Target of Opportunity program to trigger a NICER observing campaign on the next nearby binary recycled pulsar transformation to an accretion disk dominated state. This will 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.
7029	THE EXTRAORDINARY TIMING BEHAVIOR OF THE CCO PULSAR 1E1207.4-5209	ERIC GOTTHELF	The detection of glitches or timing noise in the rotation of central compact objects (CCOs) in SNRs is unprecedented for pulsars with such small spin-down rates. 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 10,000 times greater than the dipole fields inferred for CCOs. This proposal is to continue timing 1E1207.4-5209 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 to compare to theoretical models.
7036	NICER MONITORING OF A CHANGING-LOOK AGN WITH A NEWLY-LAUNCHED RADIO JET	SIBASISH LAHA	1ES 1927+654 is one of the most enigmatic changing-look AGN which exhibited a major outburst in the optical/UV in Dec 2017 followed by a vanishing X-ray corona in Aug-Oct 2018. Since May 2022 the source has shown a rise in the soft X-ray flux (as of Sept 2023 has reached SIX times the pre-flare value). In conjunction with the soft X-ray flare, from Feb-July 2023 the 5GHz core (< 1 pc, unresolved) radio flux of the source sharply increased by a factor of 35 times, from 2 mJy to 70 mJy, a unique event of a radio-quiet source becoming radio-loud in a matter of a few months, along with the presence of a new nascent jet. Our proposed program with NICER (1ks snapshot, once-a-week, for next 1 year) intends to track the source X-ray emission along with the radio flare/jet that is still ongoing.

Prop #	Title	PI Name	Abstract
7037	TRACKING THE X-RAY EVOLUTION OF ON-GOING SDSS-V CHANGING-LOOK AGN	MIRKO KRUMPE	SDSS-V, now in its full operation, will obtain repeated optical spectroscopy for thousands of AGN. This will allow for the optical identification of currently transiting changing-look AGN. We request 5 ToOs each totaling 60 ks (2 ks roughly every 4 days for 120 days) to explore how the X-ray corona, optical accretion disc, and broad-emission line region interact with each other. The NICER data will also deliver several spectra over the proposed 120 day period, which will be used to constrain the evolution of the photon index. This data set, combined with guaranteed high-cadence optical monitoring & spectroscopy, will give valuable insights into how accretion flows evolve during AGN ignitions and depletions.
7038	TRACKING THE EVOLUTION OF CORONA IN A CHANGING LOOK AGN	SIBASISH LAHA	The drastic changes seen in changing look AGNs (CL-AGNs) in short timescales (a few months to years) are challenging the simplest form of the AGN unification framework which predicts that such changes occur over far longer timescales. It seems likely that CL-AGN events are driven by surprisingly rapid and extreme changes in the accretion disk around the supermassive black hole (SMBH), which also affects the coronal emission causing large unexplained variations in flux and spectral states. The CL-AGN are therefore ideal test beds to understand the properties of coronal X-ray emission. We propose a ToO campaign targeting a newly discovered CL-AGN meeting our criteria in the upcoming cycle. Once triggered, we propose biweekly NICER monitoring, 2 ks per visit, for 6 months (total 96 ks).
7040	JOINT NICER AND SWIFT (X-RAY+UV) MONITORING OF A FUTURE STELLAR TIDAL DISRUPTION EVENT	DHEERAJ PASHAM	We propose joint NICER and Swift (X-ray + UV) ToO monitoring observations of a future non-jetted stellar tidal disruption event (TDE). Our main goals are 1) to identify and study accretion states, transitions and accompanying corona formation around a supermassive black hole (SMBH) in a TDE. This is motivated by NICER+Swift's recent success in doing so for the TDE AT2018fyk. 2) To measure the precession period of a newly formed accretion disk in soft X-rays to constrain the SMBH spin. This is again motivated by NICER's detection of a 15 d quasi-periodicity in TDE AT2020ocn which constrained the spin parameter to be between 0.05-0.5. Our goals require both X-ray and UV data, monitoring capability and a large soft X-ray effective area making NICER+Swift the ideal combination for this study.

Prop #	Title	PI Name	Abstract
7041	CATCHING A NEW MAGNETAR OUTBURST WITH NICER AND NUSTAR	ALICE BORGHESE	Isolated neutron stars powered by the instabilities and decay of their huge magnetic field, magnetars are characterized by a distinctive high-energy flaring phenomenology: short bursts of X-/gamma-rays, often accompanied by enhancements of the persistent X-ray luminosity, referred to as outbursts. Magnetar-like activity was discovered from isolated neutron stars with a broad range of magnetic field strengths. Moreover, the recent detection of a FRB-like burst from a Galactic magnetar has strengthened the belief that at least a sub-group of FRBs can be powered by magnetars. Here, we propose to follow two new magnetar-like outbursts from a known or a new source with NICER and NuSTAR to gather new physical insights on magnetar surface, field configuration and magnetosphere.
7044	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 6. NICER is the only mission capable of frequently monitoring this important new state. We also request a 25 ks NuSTAR ToO to constrain scattering and wind photoionziation. These observations will also grow a NICER legacy archive of obscured variability in GRS 1915+105.
7051	CONNECTING X-RAY AND UV EMISSION UNDER VARIABLE OBSCURATION IN THE BRIGHT AGN NGC 4151 WITH NICER AND SWIFT MONITORING	ETHAN PARTINGTON	Irradiation of a standard accretion disk by a compact X-ray source cannot explain the observed X-ray/UV lags in NGC 4151 despite UV/Optical lags which follow predictions, suggesting an extended X-ray corona or an additional reprocessor between the X-rays and the disk. However, the source is affected by highly variable obscuration which may distort size estimates of the soft X-ray corona using observed count rates. Our 4-month NICER campaign will deliver X-ray spectra with a daily cadence and sufficient S/N to obtain time-resolved measurements of the intrinsic X-ray fluxes in multiple bands, which will be tested for correlation with coordinated UV/Optical observations to map the X-ray corona and inner disk.

Prop #	Title	PI Name	Abstract
7055	SIMULTANEOUS X-RAY MONITORING OF M DWARF FLARES WITH THE HST TREASURY PROGRAM NUV SPECTROSCOPY AND TESS PHOTOMETRY	YUTA NOTSU	We request the X-ray observations of the two M dwarf flare stars GJ 1243 and CR Dra simultaneously with the HST/COS NUV spectroscopy approved as the HST Treasury program and multi-color optical photometry with TESS and ground-based telescopes. We will investigate the relations among the Neupert/non-Neupert classfications and the optical/NUV spectral properties during flares, which can greatly help to constrain the physics of a unified multi-wavelength stellar flare model. This program provides time-resolved NUV spectra and X-ray flux along with best-fit models on a wider wavelength range from X-ray through red-optical wavelengths. The results will benefit multiple astrophysics communities.
7062	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 Gemini/Zorro fast-timing measurements in the infrared. These data will be used to understand the evolution of the optical/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.
7065	CORRELATED RADIO/MM-X-RAY TIMING OF CYGNUS X-1	THOMAS MACCARONE	We propose to observe Cygnus X-1 with NICER simultaneously with millimeter band observations. These data will provide a time lag for the mm 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.
7066	DAILY PRECISION SPECTRA OF MARKARIAN 421 FOR VARIABILITY AND MULTIWAVELENGTH STUDIES	DAVID WILLIAMS	Most blazars are studied only during large outbursts, in response to activity observed by monitoring instruments. This approach reveals little about the standard behavior of a source, which requires consistent, repeated observations over a period of time, independent of the variability or flux state of the target. Mrk 421 is the perfect candidate for such studies. Daily NICER observations can provide unprecedented data to probe the particle acceleration and photon emission processes in this iconic TeV-emitting HBL, both on their own and in the rich multiwavelength context provided by other observations. NICER's large effective area and quick repointing capability make it ideally suited to acquire high-quality spectra of Mrk 421 on a daily basis with a modest investment of observing time.

Prop #	Title	PI Name	Abstract
7068	CONTINUUM-FITTING MEASUREMENTS OF BLACK-HOLE SPIN IN BRIGHT X-RAY TRANSIENT SYSTEMS	JAMES STEINER	Stellar-mass black holes in X-ray transients undergo months-long outbursts during which they explore wide-ranging accretion rates and spectral-timing states. Following transitioning to the thermal/soft state, the black hole undergoes a protracted thermal decline. The pristine thermal/soft state contains only minor contribution from the nonthermal components; most of the emission comes from the thermal accretion disk continuum. Accordingly, this state is the gold-standard for spin measurements via X-ray continuum fitting. We request 10x2ks observations during the thermal phase of the outburst, to monitor a bright black-hole transient in decline, in order to determine its spin. We request up to two triggers over the next cycle, for a maximum of 40ks.
7079	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.
7080	UNVEILING THE PHYSICS OF SUPERORBITAL MODULATIONS IN WIND-FED SUPERGIANT X-RAY BINARIES WITH NICER	ENRICO BOZZO	We propose to exploit NICER's perfectly suited capabilities to unveil the physical mechanism driving the super-orbital variability in wind-fed supergiant X-ray binaries. Our science objectives require a monitoring of these systems along their different super-orbital phases to measure stable and periodic changes in the absorption column density, flux, and eventually slope of the continuum emission across a representative number (~12) of super-orbital cycles. 96 short NiCER observations (500 s each) spanning a total of 6 months (roughly 4 observations per week, 48 ks in total), will permit us to study the mechanism driving the super-orbital variability in a representative source of this class, 4U 1538-52.

Prop #	Title	PI Name	Abstract
7082	PROMPT AND HIGH-CADENCE X-RAY FOLLOW-UP OF TRANSIENT MAGNETARS FOR UNDERSTANDING THE MAGNETAR-FRB CONNECTION	TERUAKI ENOTO	The phenomenon of Fast Radio Bursts (FRBs) is one of the most tantalizing mysteries in astronomy. However, the mechanism of how magnetars initiate FRBs is poorly understood. In October 2022, this magnetar exhibited FRBs and short X-ray bursts again. During this magnetar outburst, ToO observations and time series analyses with NICER and NuSTAR revealed a pair of glitches that occurred before and after FRBs, associated with a burst forest, providing valuable insights into this mystery. Hence, this proposal aims to prompt and high-cadence X-ray monitoring during an outburst of transient magnetars to investigate their X-ray behaviours and to search for glitches similar to those of SGR 1935+2154 and also for FRB-associated X-ray bursts.
7083	SETTING UP OF THE CENTRIFUGAL BARRIER FOR ACCRETION "IN REAL TIME"	SERGEY TSYGANKOV	We propose to observe for the first time the transition from the accretion state to the "propeller" regime in "real time". At this point the interaction of the accretion flow with magnetic field of an X-ray pulsar (XRP) is known to abruptly inhibit the accretion, however, the transition itself has not been observed up to now. As a target we propose one of the transient XRP 4U 0115+63 and V 0332+53 which had already been observed in both states, and where the time of the transition can be predicted accurately. These two objects provide thus a unique opportunity for a first detailed study of plasma interaction with the magnetic field of the NS, The unique combination of spectral and timing capabilities with great flexibility make NICER the only instrument capable of such observation.
7086	ACCRETING MILLISECOND X-RAY PULSARS WAVEFORM MODELING AND THE EQUATION OF STATE OF NEUTRON STARS	ALESSANDRO PAPITTO	Modelling of the waveform of the X-ray pulsations of accreting ms pulsars (AMSP) is one of the most promising ways to constrain the equation of state of neutron stars. However, it requires an extremely high number of counts to break the degeneracy between the many parameters that shape the X-ray pulse profiles. The polarimetric information granted by the forthcoming IXPE mission will measure the geometry of the hot spots independently, easing the requirement. We propose a 350 ks NICER ToO observation of the next outburst of an AMSP to measure the pulsar ephemeris and fold simultaneous IXPE data and derive a high statistics energy-resolved pulse profile. The proposed observation will measure the mass and the radius with an accuracy of a few per cent.

Prop #	Title	PI Name	Abstract
7104	PROBING THE NUCLEAR TRANSIENT--NEUTRINO PARADIGM WITH NICER. FOLLOW-UP OF ICECUBE GOLD ALERTS	DHEERAJ PASHAM	The astrophysical origin of the majority of IceCube observatory detected neutrinos remains unknown. Proposed counterparts to IceCube's TeV-PeV neutrinos include non-jetted nuclear transients, arising from supermassive black hole accretion. Yet, this hinges on spatial coincidence, vulnerable to IceCube's substantial localization errors. We propose X-ray follow-up of three nuclear transients coinciding with IceCube's GOLD alerts in cycle 6. Our objectives are: 1) assessing nuclear transients' neutrino associations by comparing energies under various theoretical models, and 2) unraveling the physics of feasible sources. Achieving this requires X-ray follow-up with a large area telescope like NICER, which has already demonstrated its success in ruling out a neutrino connection in AT2019dsg.
7107	LUMINOUS NOVAE IN OUTBURST	MARINA ORIO	This is a monitoring program of a luminous classical or recurrent nova in outburst. The first target is the rich emission spectrum of the shocked ejecta, measured in X-rays with NICER. Shocks are an essential phase of the nova physics, accelerating particles that cause gamma-ray emission, and contributing reprocessed optical light. When the white dwarf's atmosphere shrinks to almost pre-eruption radius with a thin layer above the burning shell, the effective temperature is hundreds of thousands K, the white dwarf is observed directly as a luminous supersoft X-ray source (SSS). This is our second target. NICER is ideal to study also the SSS, because of its response in the soft range and timing capabilities, especially useful to study periodic and aperiodic modulations occurring in novae.
7108	NICER FOLLOW-UP OF EROSITA QPE CANDIDATES SELECTED THROUGH X-RAY VARIABILITY	RICCARDO ARCODIA	Galaxies emitting X-ray Quasi-Periodic Eruptions (QPEs) from their center represent the new frontier of X-ray variable accretion onto massive black holes. To date, only 4 bona-fide QPE sources are publicly known. We aim to increase this number by following up 3 new QPE candidates selected based on their X-ray variability in the eROSITA all-sky surveys data. We designed the ideal NICER monitoring to confirm their putative nature as repeating erupters, which amounts to a total of only 69ks in total.

Prop #	Title	PI Name	Abstract
7114	WHAT CAUSES ORBITAL VARIABILITY IN CEN X-3?	PRAGATI PRADHAN	We request 45 ks to monitor Cen X-3 over 3 orbits, probing orbital variability through spectro-timing analysis. With 3 observing runs, each having 10 snapshots (1.5 ks each) per orbit, we will measure changes in absorption/line fluxes. Previous reports hinted spectral differences even within the same orbital phase, beyond mass accretion rate variations in massive X-ray binaries. NICER's exceptional sensitivity, even < 3 keV, will enable detailed studies for the first time. As Cen X-3 is an eclipsing binary, we will also compare spectra during eclipse, out-of-eclipse, and during long, aperiodic dips to investigate the circumstellar region.The proposal is part of a large campaign for multi-wavelength/broadband observations of Cen X-3,coordinated with XRISM obs to enhance scientific insights.
7117	ESTABLISHING THE TIMING PROPERTIES OF THE ISOLATED NEUTRON STAR ERASSU J131716.9-402647	JAN KURPAS	Recent NICER and XMM-Newton observations of the isolated neutron star (INS) eRASSU J131716.9-402647 discovered significant pulsed emission at a period of 12.757s. Together with the soft and thermal spectrum, superimposed by two absorption features, and thermal luminosities that could be in excess of those derived from spin-down, this source is strikingly similar to the seven known X-ray dim isolated neutron stars. The inferred limits on the timing parameters prevent a detailed study of the intrinsic properties (e.g. magnetic field, age). We propose 4 observations with a total exposure of 110ks to establish a coherent timing solution and to perform phase-resolved spectroscopy. The results will constrain the nature and place the source in the context of the Galactic INS population.
7120	SCRUTINIZING THE NEXT OUTBURST OF IGR J00291+5934	TOD STROHMAYER	We propose a target of opportunity observing campaign with NICER of the next outburst from IGR J00291+5934 should it occur during cycle 6. We request 150 ks of observing time, which will allow us to sample the full outburst evolution of this transient object at high cadence. With these data, we will be able to obtain precise measurements of the current spin rate and binary ephemeris, and place tight constraints on the long-term evolution of this binary. Additionally, we will be able to characterize the spectro-temporal variability in the soft band, and investigate the still poorly-understood coupling between the variable accretion flow and the coherent pulsations.

Prop #	Title	PI Name	Abstract
7122	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 disc 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.
7124	SEARCHING FOR CLOSE SUPERMASSIVE BLACK HOLE BINARIES WITH EROSITA, NICER, AND XMM-NEWTON	DUSAN TUBIN	eROSITA has the capability to identify exceptional AGN with periodic X-ray flux signals. These objects are potential supermassive black hole binaries (SMBHB). We request six monitoring campaigns for a total exposure of 360ks for the brightest eROSITA-selected candidate periodic AGN. Each campaign consists of six individual pointings of 10 ks each, spaced roughly four weeks apart. The campaigns are needed to track the flux modulation, discard stochastic variability, and determine the details of higher cadence NICER follow-up observations to confirm the periodic nature. The most convincing case will be observed with XMM-Newton to find a double-peaked Fe Ka line coming from the individual accretion disks of the SMBHBs. This project could discover the closest distance SMBHB up to date.
7126	MEASURING BLACK HOLE SPIN AND MASS THROUGH X-RAY REFLECTION AND REVERBERATION LAGS	GUGLIELMO MASTROSERIO	X-ray reflection in accreting black holes probes the inner region of the accretion disc, and proper modelling 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 provides 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 50 mCrab during the bright hard state for 50 ks with simultaneous NICER and NuSTAR observation in order to access unprecedented characterization of black hole spin and mass.

Prop #	Title	PI Name	Abstract
7131	NICER+VLA MONITORING OF THE SUPER-LONG QPE SOURCE SWIFT J0230+28	MURYEL GUOLO	Quasi-Periodic Eruptions (QPEs) are high-amplitude, repeating X-ray flashes from external galaxies that are possible probes of the interactions between orbiting bodies with massive black holes. Swift has recently discovered a new source that shows quasi-periodic X-ray eruptions, with a recurrence time of ~ 22 days, and likely accompanied by radio emission, revealing a new, and yet unexplored, time-scale for extragalactic nuclear transients. We request two sets of high-cadence NICER monitoring observations (2 visits of 250s for 70 days per set), and a simultaneous 5-day cadence monitoring with VLA during one of the NICER sets. Our goals are to 1) track the evolution of the eruption properties, i.e., amplitude, recurrence-time, and temperature, and ii) confirm the radio-X-ray correlation.
7133	FIRST NICER OBSERVATIONS OF WR 140 NEAR PERIASTRON: HOT GAS, ORGANICS AND THE RELIC	MICHAEL CORCORAN	We propose observing the X-ray variability of the "standard" colliding wind long-period binary WR 140 near periastron passage with NICER, when the X-ray spectrum varies greatly and dust forms. NICER observations are needed to provide measurement of the variation of the soft spectrum, which could not be done by previous RXTE or Swift observations. The proposed observations will provide key information on variations in X-ray temperature, flux and absorption column for comparison to detailed models, and monitor the appearance of the soft "relic" component seen in previous Suzaku and XMM-Newton snapshots. This will be the first time that WR 140's periastron passage will be monitored by NICER. We also ask for joint observations with NuSTAR to monitor the non-thermal emission.
7134	ANTICIPATING THE RE-BRIGHTENING 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.

Prop #	Title	PI Name	Abstract
7136	A NICER SEARCH FOR X-RAY EMISSION FROM NEARBY REPEATING FAST RADIO BURST SOURCES	AARON PEARLMAN	Fast radio bursts (FRBs) are extragalactic pulses of radio emission, whose source types are still unknown. We propose to carry out a high time resolution search for X-ray emission from nearby repeating FRB sources using simultaneous X-ray/radio observations with NICER and the Effelsberg, GBT, and CHIME radio telescopes. The activity of our targets will be monitored in the 400-800 MHz band with CHIME, and simultaneous X-ray/radio observations will be coordinated when our targets display a radio outburst. We propose for a total of 100 ks of ToO observations to observe up to 5 nearby repeating FRBs soon after radio activity is detected. These observations will be used to search for prompt and persistent X-ray emission from FRBs. The results will significantly constrain the origins of FRBs.
7141	NICER+NUSTAR OBSERVATIONS OF TIDAL DISRUPTION EVENTS: PROBING THE REAL-TIME FORMATION OF JETS AND X-RAY CORONAE	MURYEL GUOLO	Tidal disruption events (TDEs) offer excellent opportunities to study the physics of black hole accretion, including the real-time formation of jets and X-ray coronae. The field of X-ray TDE study is still so young that each object reveals new and unexpected phenomena. We propose high-cadence NICER monitoring on one X-ray bright TDE showing hard X-ray emission: i) if triggered in a relativistic/jetted TDE, we aim to probe the physical properties of nascent jet; ii) if triggered in a non-relativistic TDE, we aim to probe the accretion state transitions, the real-time formation of a hard X-ray corona and search for reflection features akin to AGN. The NICER+NuSTAR broad-band spectrum will allow us to study the geometry of the super-Eddington accreting inflow and the powering of the outflow/j
7146	REVEALING THE EVOLUTION OF TIDAL DISRUPTION EVENTS AT LATE TIMES WITH NICER	JOHEEN CHAKRABORTY	The canonical picture of Tidal Disruption Events (TDEs) suggests that the soft X-ray emission should rise sharply then decline smoothly over months, but in recent years, NICER and Swift high-cadence monitoring has revealed that the X-rays frequently do not follow this simple prescription. Furthering our understanding requires more complete late-time coverage to search for rebrightening, measure spectral evolution, and characterize any short-term variability. Based on a systematic X-ray archival analysis, we have identified 6 targets well suited for late-time follow-up. We propose to obtain NICER late-time follow-up of these TDEs, in order to test how they compare to evolution predicted by models of viewing-angle unification and slim disk evolution.

Prop #	Title	PI Name	Abstract
7151	CONTINUED NICER+SWIFT MONITORING OF REPEATING STELLAR TIDAL DISRUPTION EVENTS: BUILDING A LEGACY DATASET	DHEERAJ PASHAM	We propose joint NICER and Swift (X-ray+UV) monitoring of the two X-ray bright and time-variable sources AT2018fyk and eRASSt J045650.3-203750. A joint NICER+Swift campaign over the past 5 years (2018-2023) has captured multiple outbursts from these systems, with the interpretation that they represent repeating partial TDEs, in which accretion is driven by a star that is repeatedly stripped of mass by a black hole. Our main goals are 1) to capture additional outbursts and affirm (or refute) the repeating TDE hypothesis for these systems, and 2) acquire high-quality X-ray and UV data during the upcoming outbursts and plateau phases to compare with theoretical predictions. Our goals require long-term monitoring (~ years), high quality X-ray spectra, high X-ray sensitivity, and UV coverage.
7153	HIGH FREQUENCY X-RAY AND OPTICAL VARIATIONS IN 3C 382	MICHAEL FAUSNAUGH	The link between AGN X-ray and UV/optical emission remains poorly understood, with results in the literature often finding no correlation between X-ray and UV/optical light curves. When correlations are found, sometimes the X-ray variations lead the UV/optical, and sometimes the opposite is found. One solution to this puzzle is that the correlated variations are frequency dependent, with different physical processes governing the variations at different timescales. We propose testing this frequency-dependent hypothesis for high frequency variations in 3C 382. We will use NICER, TESS, and X-ray reflection models to determine if short timescale AGN variability is consistent with predictions from X-ray reprocessing models.
7156	PRECISION X-RAY TIMING OF A FAST-SPINNING WHITE DWARF: A CLUE FOR ITS SPIN EVOLUTION, MAGNETISM, MASS AND SUPEROUTBURSTS	KAYA MORI	A rare class of CVs harbors rapidly rotating white dwarfs (WDs), with spin periods as fast as ~30 seconds, due to substantial spin-up in their evolution paths. These fast-spinning CVs (FSCVs), currently spinning down, display unique characteristics such as WD pulsars and propeller systems. We propose to measure the spin derivative of the second-fastest spinning WD discovered in an intermediate polar (IP) called CTCV J2056-3014, and determine whether the WD is spinning down as other FSCVs or up as regular IPs. The WD spin rate is a key parameter to constrain the WD B-field, mass and spin evolution. We also request a NICER ToO to characterize the X-ray evolution of this unique FSCV during the next superoutburst, a rare outburst caused by tidal-thermal instabilities in the accretion disk.

Prop #	Title	PI Name	Abstract
7157	A NICER TIMING STUDY OF THE GAMMA-RAY PULSAR CANDIDATE 4FGL J1015.5-6030	JEREMY HARE	A bright X-ray source was observed coincident with the unidentified Fermi-LAT source 4FGL J1015.5-6030. Follow-up observations with Chandra and XMM-Newton revealed bright extended emission surrounding a point source and a spectrum consisting of a blackbody plus power-law component. The extended emission, X-ray and GeV spectrum, and lack of any multiwavelength counterpart strongly suggest this source is a pulsar hosting a pulsar wind nebula. XMM-Newton timing mode observations were carried out, but did not detect pulsations down to an intrinsic pulsed fraction of 24%. Here we propose NICER observations, which will allow us to detect pulsations down to a much deeper limit on the intrinsic pulsed fraction of ~10%.
7159	REVERBERATION MAPPING OF MRK 766: FROM THE INNER ACCRETION DISK TO DISTANT OUTFLOWS	CHRISTOS PANAGIOTOU	Intense multiwavelength monitoring campaigns of local Seyfert galaxies have been successful in mapping the outer accretion disk of these sources, while long X-ray observations have been used to probe the inner accretion flow as well as more distant obscuring outflows. NICER is the ideal instrument to unite these different techniques that probe the inner and outer regions of AGN. We propose to observe Mrk 766, which has already been approved for a Large XMM-Newton campaign, is part of the XRISM PV target list, and is currently being monitored daily with the Las Cumbres Observatory as part of an optical disk reverberation mapping campaign. Here, we propose a daily NICER monitoring (150 ks in total) of Mrk 766, in order to draw a precise map of this bright AGN at multiple scales.
7161	A LEGACY OF TURTLES: AMASSING A COMPREHENSIVE SPECTRAL-TIMING ARCHIVE OF OUTBURSTING BLACK HOLES	JAMES STEINER	Black holes in X-ray binary systems are among the brightest objects in the X-ray sky. Outbursting BHs in transient systems exhibit a characteristic Q- or turtle-shaped pattern when plotted on a hardness-intensity diagram. This pattern encodes a rich set of spectral-timing state transitions characteristic of a BH's outburst. This proposal aims to establish a legacy data archive of weekly NICER monitoring of these turtle-diagrams. Our proposed program fills in coverage gaps arising from proposals which serve more narrow scientific goals, and which often do not monitor the entirety of an outburst. We argue, on the basis of the ongoing impact of the RXTE BH data archive, that it is imperative to leverage NICER's high-throughput soft-X-ray sensitivity against the full outburst.

Prop #	Title	PI Name	Abstract
7163	MAPPING SOLAR WIND DYNAMICS THROUGH COMETARY INTERACTIONS: DUAL OBSERVATIONS OF COMETS 12P AND 62P DURING SOLAR MAXIMUM	DENNIS BODEWITS	We request 112 ksec of NICER observing time to study the interaction between the solar wind and two bright periodic comets, 12P/Pons-Brooks and 62P/Tsuchinshan. Utilizing NICER's agility and sensitivity, we aim to compare charge-exchange spectra arising from the comets' interaction with varied solar-wind states. Simultaneous observations of both comets at distinct solar latitudes allow us to compare spectra from differing solar-wind conditions. This offers a unique opportunity to map the solar wind during solar maximum and explore charge-exchange reactions in astrophysical plasmas spanning a 0.1-10 MK temperature range.
7164	BROADER PERSPECTIVES OF ACCRETION DISK AND MULTI-ION UFOS IN MAXI J1810-222	KEIGO FUKUMURA	We propose a multi-epoch, joint ToO program of BH XRB, MAXI J1810-222, to study a physical link between multi-ion ultra-fast outflows (UFOs) and yet-to-be explored reflection features with NICER (for soft X-ray UFOs) and NuSTAR (for Fe K and reflection) during an outburst. Being triggered by MAXI/GSC daily monitoring, we aim to unpack a concealed nature of powerful disk winds and disk reflection by systematically modeling and analyzing multi-epoch NICER+NuSTAR spectra. Our study is conducted by a physically-motivated wind model in the context of magnetic-driving in conjunction with state-of-the-art reflection spectroscopy to further understand a broadband X-ray phenomenology of this XRB for which NICER (30ks x3) and NuSTAR (20ks x3) play indispensable roles.
7170	RESOLVING A QUASI PERIODIC OSCILLATION IN GRS1915+105 UPON ITS RETURN TO AN UNOBSCURED STATE	EDWARD NATHAN	Before 2018, the black hole X-ray binary GRS1915+105 was extremely bright in X-rays, and at times showed powerful type-C quasi-periodic oscillations (QPOs). We propose a joint 30 ks NICER and 30 ks NuSTAR observation of a QPO in GRS1915+105 if the source leaves its current X-ray obscured state. We will apply state-of-the-art phase resolving techniques to test for the presence of a precessing corona via its effects on the flux reflected from the accretion disc.
7172	LONG-TERM EVOLUTION OF THE QPE SOURCE GSN 069	GIOVANNI MINIUTTI	GSN 069 is the first galactic nucleus in which X-ray quasi-periodic eruptions (QPEs) have been identified. These are very intense soft X-ray bursts lasting ~1 hr and recurring every few hr. The long-term evolution of GSN 069, as determined by ~ 12 yr-long public data from Swift and XMM-Newton, shows that the source is consistent with two repeating partial tidal disruption events (TDE) ~ 9 yr apart, although this interpretation of the long-term flaring activity in the X-ray band can only be confirmed with continuous monitoring over the next few years. We request monitoring observations of GSN 069 covering the whole cycle 6 to monitor its long-term evolution.

Prop #	Title	PI Name	Abstract
7174	SEARCHING FOR SUPERFLARES AND ERUPTION EVENTS FROM AN INFANT SUN, EK DRA	VLADIMIR AIRAPETIAN	Recent missions have revealed that young solar-like planet hosts produce frequent superflares, which may have profound effects on the ability of terrestrial planets to retain their atmospheres. Observations also suggest that superflares are associated with filament or prominence eruptions that signify coronal mass ejections (CMEs). X-ray and EUV emission from superflares and dynamic pressure exerted by CMEs on exoplanets influence atmospheric chemistry and heating. In order to develop theoretical models of such events and assess their impact on habitable environments, we propose to perform a multi-wavelength campaign to observe various forms of magnetic activity of a young (~ 100 Myr) solar analog, EK Dra known to produce frequent flares and filament eruptions.
7175	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 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.
7176	A NICER LOOK AT THE HARD STATE OF LMC X-3	JAMES STEINER	LMC X-3 is a persistently active black-hole X-ray binary whose behavior more resembles transient BHs than the other persistent black holes. LMC X-3 is nearly always in a disk-dominated soft state, but infrequently will enter a hard state. Crucially, the line-of-sight absorption to LMC X-3, 4e20/cm^2, is an order of magnitude (or more) lower than other Galactic black-hole X-ray binaries. This uniquely low-absorption column allows for an unobscured view of the hard-state's thermal disk, which is key to determining whether the accretion disk extends to the ISCO or is truncated at larger radii in hard states. We propose a 30ks observation of LMC X-3 to be triggered upon the detection of a hard state in LMC X-3.

Prop #	Title	PI Name	Abstract
7177	UNVEILING PARTICLE ACCELERATION MECHANISMS IN THE BLAZAR MRK 501 THROUGH PRECISION X-RAY ASTROPHYSICS	MANEL ERRANDO	The blazar Mrk 501 features a relativistic jet that accelerates particles, potentially to TeV energies, displaying rapid flux variability on minute timescales in X-ray and gamma-ray bands. However, the mechanisms responsible for this particle acceleration remain poorly understood. Recent advancements, including NICER's high-resolution spectral monitoring and the launch of IXPE, which measures X-ray emission polarization, have enabled us to probe the jet's magnetic field geometry and its impact on acceleration processes. Our proposal involves continuous monitoring of Mrk 501 during Cycle 6 using 3 ks exposures. This initiative aims to investigate changes in its spectral state and determine their duty cycle.
7182	THE TRANSITIONAL MILLISECOND PULSAR CANDIDATE, 4FGL J1943.9+2841 = SWIFT J194401.9+284450	NOEL KLINGLER	4FGL J1943.9+2841 is an unidentified Fermi-LAT source with a pulsar-like GeV spectrum. X-ray observations with Swift identified a bright X-ray source near the center of the 4FGL positional uncertainty ellipse. An optical counterpart, showing strong H emission lines, is coincident with the X-ray source. The optical colors, X-ray + optical spectra, and the GeV emission make it a strong redback millisecond pulsar binary candidate. Interestingly, the source has also shown a decrease in X-ray flux by a factor of ~20. Such changes in the flux are often seen in the rare subclass of redback binaries known as transitional millisecond pulsars. Here we propose a NICER TOO to observe this source the next time it enters and X-ray bright state to search for X-ray pulsations and orbital modulation.