

The selected proposals

(1) Core proposals

APPID	A02010026	Title	年轻脉冲星 X 射线辐射特征演化与短时标变化		
ABSTRACT	通过射电和 Atel 信息，监测 Crab、B1509-58 和 J1846-0258 三颗脉冲星的周期或者状态跃变，详细研究脉冲星的周期跃变，脉冲星的计时特征、脉冲轮廓演化和制动指数的演化情况，研究脉冲星磁场的变化的可能性。J1846-0258 存在类似磁星暴发或者状态改变时，研究宽波段能谱演化和周期的规律。脉冲星在发生巨大周期跃变时，通过计时特征研究脉冲星演化。在年轻脉冲星中寻找和研究特殊的周期跃变。				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
B1509-58	A	100	Y		
Crab	A	0	Y	Share the data with the calibration team.	
PSR J1846-0258	B	100	Y		

APPID	A02010027	Title	X 射线双星系统高能辐射研究		
ABSTRACT	<p>X 射线双星 (XRB) 是银河系中最主要的 X 射线源, 它们的高能辐射不仅反映了致密星周围吸积流的结构, 还与致密星的性质 (质量, 自旋以及磁场等) 和 XRB 的演化状态紧密相关, 是研究高能天体物理、恒星演化理论、广义相对论、吸积盘理论、磁流体力学等的重要实验室(Frank et al. 2002)。XRB 的高能辐射一般表现为在 X 射线能区的高亮度爆发演化。因此, 在 X 射线能区具有宽波段、大面积、高时间和能量分辨而且适用于亮源观测的慧眼-HXMT 望远镜(Zhang et al. 2014), 通过系统观测 XRB 的爆发演化, 将给出一批 XRB 爆发演化的高统计观测样本(liu et al. 2006), 并用于精细研究 XRB 的高能辐射机制。本提案将基于慧眼-HXMT 对一批 XRB 的高统计观测, 精细测量致密天体的基本性质, 系统研究辐射的基本环境; 精细测量爆发演化的时变特性 (X 射线暴, 功率谱, QPO, rms 和时间延迟等), 系统研究吸积爆发的盘冕及其相互关联关系; 精细观测爆发的能谱态演化, 系统研究吸积辐射及其演化的物理过程。</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
Cen X-3	A	500	N		
GX 301-2	A	400	N		
Vela X-1	A	1000	N		

4U 1636-536	A	600	Y		
Aql X-1	A	600	Y		
Cen X-2	A	1000	Y		
Cir X-1	A	700	Y		
Cyg X-1	A	600	Y		
GS 1826-238	A	600	Y		
Swift J1658.2-4242	A	1000	Y		
Swift J1753.5-0127	A	1000	Y		
GX 301-2	B	400	N		
4U 0115+63	B	400	Y		
4U 1728-34	B	1000	Y		

4U 1820-30	B	1000	Y		
Cyg X-2	B	1000	Y		
Cyg X-3	B	1000	Y		
GRO J1008-57	B	1000	Y		
H 1417-624	B	1000	Y		
Her X-1	B	400	Y		
MAXI J1535-571	B	2000	Y		
MAXI J1836-194	B	700	Y		
V 0332+53	B	1000	Y		
GX 17+2	C	1500	N		
1A 0535+262	C	1000	Y		
3A 0620-003	C	1000	Y		
1H 1249-637	C	1000	Y		
2E 0050.1-7247	C	1000	Y		
2RXP J130159.6-635806	C	1000	Y		

2S 1845-024	C	1000	Y		
3A 0726-260	C	1000	Y		
4U 1036-56	C	1000	Y		
4U 1538-52	C	1000	Y		
4U 2206+54	C	1000	Y		
AX J0049-729	C	1000	Y		
Ginga 1839-04	C	1000	Y		
Ginga 1855-02	C	1000	Y		
GRS 1739-278	C	1000	Y		
GS 0834-430	C	1000	Y		
GX 304-1	C	1000	Y		
GX 339-4	C	1000	Y		
H 1145-619	C	1000	Y		

H 1743-322	C	1000	Y		
IGR J00291+5934	C	1000	Y		
IGR J17591-2342	C	1000	Y		
IW Eri	C	1000	Y		
KS 1947+300	C	1000	Y		
MAXI J1348-630	C	1000	Y		
MAXI J1409-619	C	1000	Y		
MAXI J1543-564	C	2000	Y		
MAXI J1631-479	C	1000	Y		
MAXI J1727-203	C	1000	Y		
MAXI J1813-095	C	1000	Y		
MXB 0656-072	C	1000	Y		

PSR J0111-7317	C	1000	Y		
RX J0052.9-7158	C	1000	Y		
RX J0053.8-7226	C	1000	Y		
RX J0059.2-7138	C	1000	Y		
RX J0117.6-7330	C	1000	Y		
RX J0440.9+4431	C	1000	Y		
RX J0812.4-3114	C	1000	Y		
SAX J0146.9+6121	C	1000	Y		
SAX J1810.8-2609	C	1000	Y		
SAX J2239.3+6116	C	1000	Y		
Sco X-1	C	1000	Y		
Swift J0243.6+6124	C	1000	Y		

Swift J1858.6-0814	C	1000	Y		
SWIFT J2000.6+3210	C	1000	Y		
X Per	C	1000	Y		
XTE J0055-724	C	1000	Y		
XTE J1855-026	C	1000	Y		
XTE J1859+083	C	1000	Y		
APPID	A02050033	Title	黑洞 X 射线双星转换态吸积盘结构的观测研究		
ABSTRACT	<p>基于黑洞 XRB 经过多年的观测研究建立了黑洞 XRB 的标准盘理论模型，在这个模型中，源处于低硬态时吸积盘截断，随吸积率增加，内盘半径减小，直至高软态时吸积盘达到最内稳定圆形轨道 ISCO。然而最近的时变和能谱的观测研究发现，吸积盘可能在硬转换态就达到了 ISCO。利用具有宽能段、高时间分辨以及大有效面积的 HXMT 对黑洞暂现源的观测，将非常有利于这些问题的解决。</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2

GRS 1915+105	B	1000	Y		
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(2) Guest proposals

APPID	A02040007	Title	Proposal for GRS 1915+105 during its outburst	PI	Ms.XueyingZheng
ABSTRACT	<p>As one of the three basic parameters of black hole, spin is of great significance for understanding black hole. Accurate measurement of spin has always been the frontier scientific goal, but black hole with precise spin measurement is just a few. The galactic BH X-ray binary GRS 1915+105 has long been known for its high luminosity and high outburst rate. It's an ideal target for measuring spin. This source has been observed by HXMT, but unfortunately, no observations meeting the measurement conditions criterion for the system changed with time. Under the circumstance that the method and technology are mature and the new system parameters are updated, we hope to apply HXMT follow-up observations to GRS 1915+105 when it bursts.</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
GRS 1915+105	B	700	Y		

APPID	A02040035	Title	Hunting for ms pulsars with Insight	PI	Dr.AlessandroPapitto
ABSTRACT	<p>The discovery of accreting millisecond X-ray pulsars demonstrated that a neutron star can be spun up to a millisecond spin period in a low-mass X-ray binary. More recently, transitional millisecond pulsars that switch back and forth radio and X-ray pulsar behaviour proved the tight link existing between rotation- and accretion-powered pulsars. All these systems show unpredictable, a few weeks-long bright accretion-powered X-ray outbursts during which X-ray pulsations can be detected. We propose an Insight-HXMT target of opportunity observation of an X-ray outburst of (i) a known accreting ms pulsar, (ii) a transitional ms pulsar, (iii) an unidentified bright X-ray transient, to detect X-ray pulsations and determine the spin evolution of the pulsar. This will increase the knowledge of the evolutionary paths followed by NS, and possibly lead to breakthrough discoveries of extremely quickly rotating objects.</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
IGR J00291+5934	A	100	Y		
IGR J18245-2452	A	100	Y		
XSS J12270-4859	A	100	Y		

PSR J1023+0038	B	100	Y		
NEW XRT	C	100	Y		
APPID	A02040040	Title	黑洞 X 射线双星光谱态转变演化过程的精确测量及理论模型检验	PI	Prof.WeiminYuan
ABSTRACT	<p>黑洞 X 射线双星表现出复杂的光谱态转变演化特性，而态转变发生的物理过程和机制尚不清楚。迄今，完整的态转变只在极少数源里观测到，尤其缺乏高采样率、宽波段和高统计量的观测。本提案将利用 HXMT 对处于爆发态的黑洞 X 射线双星进行一个完整周期的针对光谱态转变的观测，重点是开展爆发的上升和下降时态转变发生过程中的能谱和时变的高采样频率、宽波段的精准观测；并在此基础上开展对吸积态转变物理模型的检验和改进。</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
XTE J1859+226	B	200	Y		
GRO J0422+32	B	160	Y		
4U 1543-47	C	200	Y		

V4641 Sgr	C	200	Y		
APPID	A02040042	Title	磁星暴发的机会目标 (ToO) 观测	PI	Dr.LinLin
ABSTRACT	<p>不可预期的暴发活动是极强磁场脉冲星（磁星）的一个重要特性，与磁星持续辐射的能谱变化、流量增强以及脉冲性质的突变有着密切关联。近期，在超新星遗迹的中心致密天体和高磁场转动供能脉冲星中也捕捉到类似于磁星的暴发活动。本提案将对进入暴发活跃期的磁星、中心致密天体和高磁场转动供能脉冲星进行 ToO 观测。借助 HXMT 的宽能段和良好时间、能量分辨率的观测来研究磁星的辐射机制和物理性质，与其他脉冲星的关系，以及脉冲星的演化。</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
PSR J1846-0258	A	10	Y		
1E 1048.1-5937	A	10	Y		
1E 1841-045	A	10	Y		
4U 0142+61	A	10	Y		

CXOU J010043.1-721134	A	10	Y		
PSR J0726 - 2612	B	10	Y		
PSR J1119-6127	B	10	Y		
SGR 0418+5729	B	10	Y		
SGR 0501+4516	B	10	Y		
SGR 0755-2933	B	10	Y		
SGR 1935+2154	B	10	Y		
SGR 2013+34	B	10	Y		
APPID	A02040049	Title	吸积毫秒 X 射线脉冲星 SAX J1808.4-3658 HXMT 观测研究	PI	Prof.GuoqiangDin g

ABSTRACT	<p>本提案申请 HXMT 对首个吸积毫秒 X 射线脉冲星 SAX J1808.4-3658 进行观测，利用 HXMT 宽能区、高分辨率观测数据，分析宽能区能谱，研究其辐射机制、限定吸积盘参数、研究爆发期间吸积盘的演变；研究吸积盘与磁球的相互作用，从而估计中子星表面磁场强度；与 Z 源及 Atoll 源辐射规律及辐射机制进行比较，从而研究 X 射线脉冲产生的条件及机制。利用 HXMT 高时间分辨率观测数据研究准周期震荡(QPO)现象及时延。分析 HXMT 光变曲线中 I 型 X 射线暴能谱，从而估计中子星质量、半径，限定中子星物态方程，研究致密星性质。</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
SAX J1808.4-3658	C	220	Y		
APPID	A02050039	Title	低质量 X 射线双星 4U 1636-53 的高能辐射研究	PI	Dr.GuobaoZhang
ABSTRACT	<p>低质量中子星 X 射线双星(NS-LMXB) 4U 1636-53 在不同的演化态展现出了丰富的观测现象 (mHz QPO, 低频 QPO, kHz QPO, I 型暴, 超级暴, X 射线脉冲)。是研究中子星物理、广义相对论、吸积盘理论、磁流体力学等的重要实验室。由于其亮度比较高，正好可以发挥慧眼-HXMT 望远镜在 X 射线能区宽波段、大面积、高时间和能量分辨的特点。本提案将基于慧眼-HXMT 对 4U 1636-53 进行高强度观测，测量致密天体的基本性质 (质量, 半径)，系统研究在不同的能谱态下吸积爆发的盘冕及其相互关联关系；系统研究 I 型暴在不同能态的产生条件和演化过程。</p>				

Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
4U 1636-53	B	520	Y		
APPID	A02040052	Title	Follow-up Observations on Astrophysical Neutrinos from IceCube	PI	Dr.DonglianXu
ABSTRACT	<p>We here propose target-of-opportunity observations of potential electromagnetic counterparts to high-energy neutrino events detected by the IceCube neutrino observatory using Insight-HXMT. Recent evidence for a correlation between high-energy neutrinos and a blazar point to an AGN origin of a fraction of the astrophysical flux detected by IceCube. In these sources, neutrinos are emitted via charged pion decays produced in the interaction of protons accelerated in the jet or the core of the AGN with ambient low-energy photons. The charged pions are accompanied by neutral pions that decay into very-high-energy gamma rays. As the AGN environment is optically thick to VHE gamma rays, these would lose energy via electromagnetic cascades resulting in a high photon flux in the hard X-ray to MeV range. The unique sensitivity of Insight-HXMT, in particular of its HE payload, to this emission makes it a perfect instrument for the follow-up of these neutrino events.</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
TXS0506+056	B	164	Y		

APPID	A02050016	Title	大质量 X 射线双星的辐射机制和伴星星风	PI	Dr. Jiren, Liu
ABSTRACT	<p>大质量 X 射线双星处于大质量恒星-致密星到致密星-致密星的过渡阶段,是形成引力波源的双致密星系统的前身。它们的致密星(中子星或黑洞)通过吸积大质量伴星的星风产生强烈的 X 射线辐射。大质量恒星的演化对星系演化,宇宙再电离历史,引力波源等问题都至关重要,而其星风的物理特征(团块性质和外流率)是目前尚不确定的一个主要问题。大质量 X 射线双星系统提供了一个研究致密星和大质量恒星星风的理想实验室。慧眼望远镜的宽波段和大面积能力可以提供进行这些研究所需的宽波段能谱和时变信息。我们提议利用慧眼望远镜观测三个亮的有掩食现象的 X 射线双星:4U1700-37,4U1538-522,和 OAO1657-415。掩食期的宽波段散射谱是研究星风性质的理想数据,而非掩食期的能谱可以同时研究星风性质和中子星的磁场。结合慧眼望远镜已有的 GX301-2 和 Vela-X1,这些样本将提供对致密星辐射和大质量恒星星风特征的系统研究。</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
OA0 1657-415	A	150	Y		
4U 1538-522	A	100	Y		

APPID	A02050017	Title	The Hard to Soft State Transition in Black Hole Transients in Outburst from Radio to Gamma-Rays	PI	Dr.Pierre-olivier Petrucci
ABSTRACT	<p>We propose to perform a series of 20×10 ks Insight-HXMT observations (spaced by a few days) of a (new or known) microquasar during the initial hard to soft state transition. This monitoring will be performed in a multi-wavelength context through separate (accepted) radio/opt/NIR programs. Our goal is to witness the high-energy evolution of a BH and the connections to radio (jet) and gamma-ray (hard tail, jet?) properties to better understand the accretion/ejection processes occurring in these objects. Thanks to the combination of the unprecedented broadband coverage, high energy (>50 keV) spectral and temporal sensitivity of Insight-HXMT, and together with multi-wavelength approach our monitoring will allow us to i) disentangle the different contributions to the broadband continuum emission (strength of the reflection hump, test of thermal Comptonization vs hybrid, jet models), ii) reveal the relationship between the hard X/soft gamma-ray emission and the jet activity and iii) witness the state transition and its relation with major / 'superluminal' ejections iv) follow the evolution of all these components in the different spectral states v) with HXMT we will continuously probe the properties of the fast variability up to an energy never achieved with RXTE.</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
GX 339-4	A	200	Y	Coordinate observations	

unknown BH transient	A	200	Y		
XTE J1550-564	C	200	Y		
APPID	A02050018	Title	利用 X 射线和射电高时间分辨观测探究微类星体喷流快速光变特征	PI	Dr.Zhen Yan
ABSTRACT	<p>最近几年，多波段快速光变成为研究微类星体吸积和喷流物理的一个非常重要的手段。微类星体的射电辐射主要来自于喷流，利用射电波段的快速光变以及它们同 X 射线快速光变的相关关系，进而可以研究吸积对于喷流的作用，喷流结构和运动等科学问题。本提案计划利用 HXMT 协同地面射电望远镜阵列（EVN 或者 VLA）开展针对明亮微类星体的高时间分辨联合观测，获取同时的射电和 X 射线波段的快速光变特征，进而研究喷流和吸积的相互作用以及喷流物理。针对射电观测，我们计划应用一种新数据处理方法探测微类星体射电波段的快速光变信号。</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
GRS 1915+105	A	10	Y	Coordinate observations	
Cyg X-1	A	10	Y		

Cyg X-3	A	10	Y		
APPID	A02050019	Title	A NICER Insight into Black Hole X-ray Binary Outbursts in the 0.5 - 250 keV Band	PI	Mr.JiachenJiang
ABSTRACT	<p>We request a monitoring program of one of six black hole (BH) transients with low Galactic reddening when in outburst, consisting of 20 Insight-HXMT observations each with 20 ks exposure. Our observations will be triggered by the MAXI and Swift-BAT monitoring program and will be taken simultaneously with already approved NICER ToO observations. With our proposed observations, we will be able to study the inner accretion process during an outburst in the 0.5 - 250 keV band. 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.</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
1A 0620-00	A	400	Y	Coordinate observations	
MAXI J1659-152	B	400	Y		
Swift J1753.5-0127	B	400	Y		

XTE J1817-330	C	400	Y		
APPID	A02050020	Title	Hunting for the hard tails of the X-ray sources 4U 0614+091 and GX 349+2 with the Insight-HXMT mission	PI	Dr.Angelo F. Gambino
ABSTRACT	<p>We ask to observe for the first time with Insight-HXMT the atoll source 4U 0614+091 and the Z source GX 349+2 with the aim of collecting good statistics broad-band spectra, and to constrain the hard X-ray emission observed in the spectra of these sources. The presence of a hard spectrum in 4U 0614+091 was observed for the first time by Piraino et al. (1999) in a broad-band BeppoSAX observation, in which the spectrum was modeled with a power-law and a reflection component. No cut-off was detected below 200 keV, while an indication of a correlation between the reflection intensity and the power-law photon index was highlighted. A hard power-law tail and a broad emission line at 6.7 keV were detected by Di Salvo et al. (2001) in a BeppoSAX observation of GX 349+2, with the source located between the Normal branch and the Flaring Branch of its color-color diagram. Iaria et al. (2004) obtained a weak detection of the same hard X-ray emission and the emission line at 6.7 keV, analyzing a BeppoSAX observation with the source inside the Flaring Branch. To study the physical properties of the hard emissions of these sources and its correlation with the spectral state, we need to observe each source with simultaneous use of all the instruments onboard HXMT. The simulations of the spectra of the proposed sources for the requested Exposure Time (ks) are promising for our purpose.</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2

GX 349+2	B	100	N		
APPID	A02050023	Title	Clocked burster GS 1826-238 反常软态的观测	PI	Dr.LongJi
ABSTRACT	Clocked burster GS 1826-238 在 2014 年进入了“反常软态”，并持续至今。在软 X 波段，呈现出热康普顿谱，而在硬 X 波段谱型未知。另外，在“反常软态”中，发现了 mHz 信号，该信号被认为是由于吸积物质的临界燃烧引起的。本提案中，我们申请 5 次 HXMT 观测，观测间隔为月量级，每次观测 30ks。通过 HXMT 观测，我们能够确定宽波段的能谱，以及谱型的演化。另外，HXMT 有机会找到 mHz 信号，这有助于吸积过程的研究。				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
GS 1826-238	B	150	Y		
APPID	A02050024	Title	利用 HXMT 卫星宽波段 X 射线时变和能谱探究黑洞吸积演化	PI	Dr.Zhen Yan

ABSTRACT	<p>黑洞最内区吸积几何以及演化还存在一些争议，不同观测给出了互相不一致的结果。我们计划利用 HXMT 对黑洞暂现源的明亮硬态和中间态实施高频次监测观测，利用宽波段能谱和不同能段时变的方法分别研究黑洞吸积几何的演化，此外结合不同爆发的观测研究除吸积率外其它影响吸积几何演化的参数。</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
H 1743-322	A	30	Y		
GX 339-4	B	30	Y		
APPID	A02050025	Title	Optical/Infrared—X-ray Correlations in Low-Mass X-ray Binaries	PI	Dr.Yi-JungYang

ABSTRACT

Several studies have shown that there is a global correlation between X-ray and optical-infrared (OIR)/ultraviolet (UV) emissions in low-mass X-ray binaries (LMXBs). However, the emission processes in these energies are still poorly understood. Detailed studies with (quasi-) simultaneous OIR and X-ray data of LMXBs throughout a whole outburst is lacking. Therefore a monitoring program in both X-ray and OIR is crucial for studying the correlation between the X-ray and optical properties of these systems in detail. We therefore propose a joint monitoring program between HXMT and the 2-m robotic Faulkes Telescopes. The Faulkes Telescope observations are part of an on-going monitoring campaign of >40 low-mass X-ray binaries. Together with HXMT, we expect to track the OIR-X-ray correlation of several LMXBs in detail during the HXMT operation time, with both recurrent outbursts of known targets and new transient sources found or followed by HXMT, especially at higher energies (i.e., HE: 30-250 keV, a unique feature of HXMT). In addition, it has been found that the nature of the compact object in the binary system, the mass of the companion and the distance/reddening can be constrained by (quasi-) simultaneous OIR and X-ray luminosities. These can be used soon after discovery to identify the nature of future HXMT discovered sources.

Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
1RXS J180408.9-342058	A	200	Y	Coordinate observations	
4U 1608-52	A	200	Y		
4U 1957+11	A	200	Y		
GRS 1009-45	A	50	Y		
GRS 1124-68 (Nova Mus 91)	A	50	Y		

H 1705-250 (Nova Oph 77)	A	200	Y		
HETE J1900.1-2455	A	200	Y		
MAXI J0556-332	A	200	Y		
MAXI J1807+132	A	200	Y		
MAXI J1828-249	A	200	Y		
MAXI J1836-194	A	200	Y		
MAXI J1910-057	A	200	Y		
SWIFT J174510.8-2624	A	200	Y		
1A 0620-00	B	200	Y		
AX J1549.8-5416	B	200	Y		
Cen X-4	B	200	Y		
GRO J1719-24	B	200	Y		
GS 1354-64	B	200	Y		

IGR J17091-3624	B	200	Y		
MAXI J1910-057	B	200	Y		
Swift J1357.2-0933	B	200	Y		
XTE J0929-314	B	200	Y		
XTE J1118+480	B	200	Y		
XTE J1728-295	B	200	Y		
XTE J1752-223	B	50	Y		
XTE J1814-338	B	200	Y		
XTE J2123-058	B	200	Y		
APPID	A02050028	Title	使用铁线测量中子星低质量 X 射线双星系统的吸积盘内半径		PI

ABSTRACT	本提案希望使用慧眼卫星观测一批明亮的中子星低质量 X 射线双星 (low-mass X-ray binaries; LMXBs) 系统, 获得宽能段、无 pile-up 效应的高统计数据。通过拟合铁线精确测量吸积盘的内半径, 获得中子星的半径上限从而限制超致密物质的物态方程, 并且限制中子星的磁场强度。				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
GX 3+1	A	20	N		
GX 340+0	B	20	N		
Ser X-1	B	20	N		
APPID	A02050029	Title	热核暴作为探针研究中子星 X 射线双星的吸积盘和冕	PI	Dr.Yu-PengChen
ABSTRACT	中子星 X 射线双星中, 发生在中子星表面的秒量级的核聚变, 被称为热核暴, 或者一型 X 射线暴。这种辐射会和其周围吸积环境 (冕和吸积盘) 发生相互作用, 例如冷却周围高温电子组成的冕, 本项目利用这些相互作用作为探测研究中子星双星的吸积物理过程, 主要包括: 1) 申请慧眼-HXMT 对热核暴源更多的观测数据, 完成自动寻找热核暴程序 (pipeline), 增加热核暴研究样本, 加入国际热核暴数据库 MINBAR; 2) 利用慧眼-HXMT 和 NICER 等其他 X 射线卫星的观测数据, 对热核暴期间连续谱的变化进行分析, 增加冕被热核暴冷却的观测样本, 系统研究热核暴对吸积环境的影响; 3) 挑选有掩蚀现象的 PRE 热核暴源, 研究不同吸积态下热核暴 touchdown 时流量与观测倾角&吸积盘内半径的关系; 4) 申请 4U 1728-34 慧眼观测数据, 联合 RXTE 和慧眼-HXMT 的 4U 1728-34 的 PRE 暴, 完成颜色因子等修正, 给出中子星的质量&半径估计。				

Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
Aql X-1	B	500	Y		
APPID	A02050031	Title	Hunting for cyclotron resonance scattering features in three accreting pulsars	PI	Dr. Lorenzo Ducci
ABSTRACT	<p>We propose to observe three high-mass X-ray binaries (HMXBs) containing pulsars, EXO2030+375, KS1947+300, and OAO1657-415, to perform spectral and timing analysis with the main aim to search for cyclotron resonance scattering features (CRSFs) in their average and phase-resolved spectra. We will also exploit the broadband capabilities of Insight-HXMT to constrain the physical interpretations of the spectra observed, to study the pulse profile variability and its energy and luminosity dependency, and to search for quasi-periodic oscillations in their power spectra. All these measurements will allow us to gain fundamental information to understand the accretion processes in these binary systems and the broader context of the overall population of accreting pulsars in high-mass X-ray binaries.</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
OAO 1657-415	B	200	N		

EXO 2030+375	B	100	Y		
KS 1947+300	B	200	Y		
APPID	A02050032	Title	Sco X-1 时变与高能辐射性质研究	PI	Dr.Shumei, Jia
ABSTRACT	<p>天蝎座 X-1 (Sco X-1) 是天空中最亮的 X 射线源, 由于慧眼-HXMT 卫星具有宽波段、高时间分辨和无 pile-up 的特点, 因此对于 Sco X-1 的时变性质及宽波段辐射性质研究具有明显优势。本提案拟通过对 Sco X-1 的强爆发进行观测, 得到完整的 HID 图, 研究 QPO 尤其是 FBO 的性质与能量的依赖关系, 确认并研究 Sco X-1 高能段 kHz QPO 性质, 并且开展 Sco X-1 的宽波段辐射性质 (尤其高能尾巴) 的研究。</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
Sco X-1	A	400	N		
APPID	A02050036	Title	Timing analysis of Black Hole X-ray binaries with propagating fluctuations	PI	Dr.StefanoRapisarda

ABSTRACT

X-ray emission from black hole X-ray binaries (BH-XRBs) is characterized by short time scale variability. Understanding the physical mechanism responsible for this variability would give fundamental insights on the geometry of the accretion flow around black holes and, ultimately, on the physics of accretion onto compact objects. Despite the variability has been studied since the discovery of BH-XRBs, its origin is still a matter of debate. In this context, I propose to investigate the variability using a propagating fluctuation model I developed in the last few years. According to this hypothesis, the observed X-ray variability results from mass accretion rate fluctuations that propagate in the accretion flow. This mechanism allows predicting simultaneously power spectra in different energy bands, cross-spectra, and coherence between those bands. In order to constrain all the physical parameters of the model, high-statistics observations in different energy bands are needed. Therefore, I propose ToO observations of different BH-XRBs into outburst with HXMT. I will use these data to combine timing analysis with propagating fluctuations and spectral analysis. Thanks to this innovative approach, it will be possible to obtain fundamental information about the origin of the variability and the geometry of the accretion flow during an outburst.

Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
GS 2000+25	B	200	Y		
Cyg X-1	C	200	Y		
APPID	A02050037	Title	黑洞 X 射线双星态转换的多波段观测研究	PI	Dr.LiangZhang

ABSTRACT	<p>黑洞 X 射线双星在爆发期间通常经历由硬态向软态的转换，态转换期间伴随着能谱和时变性质的快速变化，以及喷流结构和性质的演化。本提案计划利用慧眼卫星详细研究态转换期间能谱和时变性质的演化，包括能谱幂律指数和高能截断的演化、QPO 性质随时间及能量依赖性的演化等，探讨态转换发生的条件、吸积几何和 QPO 的产生机制等问题。同时结合多波段观测，研究态转换期间喷流性质的演化，并与能谱和时变性质作对比，探讨喷流的产生机制及其对能谱和时变性质的贡献。这一研究对我们更好地理解内吸积流和喷流有重要的意义。</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
Swift J1539.2-6227	A	200	Y		
4U 1630-47	B	200	Y		
Swift J1658.2-4242	B	200	Y		
XTE J1650-500	B	200	Y		
APPID	A02050038	Title	用慧眼卫星监测两颗掩食的 X 射线双星	PI	Prof.ShengbangQian

ABSTRACT	<p>X 射线双星是毫秒脉冲星的前身星，同时也是寻找系外行星等的天然实验室。该提案计划使用慧眼卫星对两颗掩食的 X 射线双星进行长期监测，获取高精度的 X 射线掩食轮廓和中食时刻，并结合前人的数据，分析样本双星的轨道周期长期和周期性变化规律。研究致密伴星的物质吸积过程及其物理机制，探讨 X 射线双星与毫秒脉冲星间的演化联系。并通过光时轨道效应的分析搜寻绕 X 射线双星转动的系外行星，研究极端物理条件下系外行星的形成演化。</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
EXO 0748-676	B	40	Y		
APPID	A02050041	Title	HXMT ToO observations of ultracompact X-ray binaries 4U 0614+091 and 2S 0918-549	PI	Dr.WenfeiYu

ABSTRACT

Observations in the past few decades showed that ultra-compact neutron star LMXBs have the lowest hard-to-soft transition luminosity (around 0.003-0.05 Eddington luminosity) among the Galactic X-ray binaries, consistent with those lowest observed in black hole X-ray binaries such as Cygnus X-1. This is quantitatively inconsistent with the prediction of the radiative inefficient accretion flow (ADAF) model, which predicts that the spectral transition from the hard state to the soft state in neutron star LMXBs should occur at a luminosity roughly an order of magnitude lower. The lowest observed limit of transition luminosity puts a critical constraint on theoretical models, therefore accurate measurements of the lowest hard-to-soft transition luminosity are very important. HXMT payloads cover the energy range from 1 keV to more than 100 keV, allowing us to achieve a more accurate and significant estimate of the transition luminosity than previous measurements. 2S 0918-549 and 4U 0614+091 are persistent ultra-compact neutron star X-ray binaries usually showing spectral transitions back and forth every 10-20 days or so. Such frequent transitions allow obtaining a good spectral transition sample with relatively fewer observations. Here we propose HXMT observations on a daily basis to both monitor their spectral evolution and to detect several hard-to-soft transitions and soft-to-hard transitions in either targets.

Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
4U 0614+09	B	30	Y		
2S 0918-549	B	60	Y		

APPID	A02050043	Title	Simultaneous X-ray and Optical Observations of Sco X-1	PI	Dr.WenfeiYu
ABSTRACT	<p>Many X-ray binaries exhibit sub-second correlated variability in the energy bands from infrared to X-rays. Since rapid X-ray variability such as QPOs in both black hole and neutron star X-ray binaries originates from the very vicinity of the compact objects, fast multi-wavelength variability can be a probe of the innermost accretion flow and jet flow as well. To explore this possibility, high time resolution multi-wavelength observations are required. Here we propose simultaneous HXMT and optical timing observations of the brightest persistent X-ray binary Sco X-1. Our goal is to identify optical variability components, and their relations to X-ray components (e.g., band limited noise, normal branch oscillations, and horizontal oscillations). It is known that the horizontal oscillations are analogous to the low frequency QPOs in black hole transients, which is suspected as to originated from the Lense-Thirring precession. The simultaneous X-ray and optical observations would not only reveal the link between the X-ray and the optical variability but also test if the horizontal oscillations are due to Lense-Thirring precession.</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
Sco X-1	A	40	Y	Coordinate observations	
APPID	A02050044	Title	黑洞 X 射线双星高频 QPO 的宽能段观测研究	PI	Dr.QingchuiBu

ABSTRACT	<p>本提案拟利用慧眼卫星研究黑洞 X 射线双星中的高频准周期震荡 (QPO) 现象, 探讨高频 QPO 在高能 (> 30 keV) 辐射段的性质, 从而限制高频 QPO 的理论模型。同时, 借助 NICER 对高频 QPO 在低能 (< 3 keV) 段的观测性质进一步限制其理论模型。目前对于黑洞高频 QPOs 的理论解释全部建立在广义相对论理论框架下, 但是缺少足够的观测样本去限制模型。本提案计划利用慧眼对一批明亮的黑洞暂现源的高统计观测, 研究黑洞高频 QPO 的宽能段辐射性质, 探讨其起源。</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
XTE J1859+226	A	20	Y		
GRO J1655-40	C	20	Y		
APPID	A02050045	Title	Insight-HXMT 观测第二强的脉冲星 J2022+3842	PI	Dr. Yuanjie, Du
ABSTRACT	<p>脉冲星的多波段观测对于研究其辐射机制非常重要。多波段、高信噪比的脉冲轮廓分析可对辐射区几何模型提供严格的限制。宽能段、高信噪比的计时和谱观测有助于深入地理解高能粒子在脉冲星磁层中的相关物理过程。PSR J2022+3842 是一颗的、自转周期约为 48.57 毫秒、自转能损率仅次于 Crab 的第二强脉冲星, 其在射电到伽玛射线波段的脉冲辐射都可以观测到。为了对该脉冲星的多波段脉冲轮廓、谱特性进行全面、细致的了解, 我们特申请 HXMT 在 HE、ME、LE 三个能段的望远镜于近期对 PSR J2022+3842 进行不少于 60 ks 的曝光观测。</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2

PSR J2022+3842	C	60	N		
APPID	A02050046	Title	Insight-HXMT 对黑洞 X 射线双星时变性质的观测研究	PI	Dr.Xiang, Ma
ABSTRACT	<p>在黑洞 X 射线双星系统 (BHXB) 中广泛存在快速 X 射线光变现象, 时变分析是研究 BHXB 的有效手段。近年来, 虽然人们对时变现象的观测特征研究有了很大进展, 但是对它们的起源等问题还有争议, 具有宽能段、高时间分辨以及大有效面积的 HXMT, 将非常有利于这些问题的解决。基于慧眼卫星对 BHXB 的观测数据, 本提案将系统研究 QPO 的高能统计性质, 限制现有的理论模型; 扩大 QPO 现象的统计样本, 比较不同系统的 QPO 现象; 检验吸积流几何模型。</p>				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
XTE J1550-564	B	160	Y		
APPID	A02050047	Title	吸积脉冲星的多波段研究	PI	Dr.JingzhiYan

ABSTRACT	吸积脉冲星一直是空间 X 射线天文卫星观测的热点，即使如此，关于吸积脉冲星 X 射线辐射机制的一些基本问题还没有得到很好的解决。本课题利用 HXMT 对一批吸积 X 射线脉冲星进行长期的时变和能谱监测，研究致密星强磁场和强引力场下的物质吸积过程、X 射线辐射机制，确定中子星的磁场、半径以及质量等基本参数，最终限制中子星的物态方程。同时可以监测 X 射线脉冲星的活动性，联合其它波段的观测，研究吸积脉冲星的 X 射线爆发机制。				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
Her X-1	A	160	Y	Coordinate observations	
1 A0535+262	A	160	Y		
4U 0115+63	A	160	Y		
KS 1947+300	A	160	Y		
MXB 0656-072	A	160	Y		
X Per	A	160	Y		
APPID	A02030050	Title	基于慧眼卫星和脉冲星试验 01 星联合观测的星载计时设备漂移误差标定方法和在轨导航验证	PI	Prof.WeiZheng

ABSTRACT	星载计时设备（晶振和原子钟）的漂移会极大影响 X 射线脉冲星导航精度。为此，本提案提出利用慧眼卫星和脉冲星试验 01 星联合观测来标定星载计时设备漂移误差的方法并验证该方法性能。该提案通过分析慧眼卫星对 Crab 脉冲星（PSR B0531+21）可见性和曝光量，从计时设备漂移误差的建模和修正等角度论证了方法的可行性。结果表明，利用本观测提案，可实现慧眼卫星的晶振漂移抑制在 50 微秒以内。在此基础上，可利用慧眼卫星的数据标定 01 星的钟差，并在轨验证脉冲星导航性能。该提案的实施，将在国际上率先实现利用实测脉冲星数据修正星载计时设备漂移。				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2
Crab	C	0	N	Coordinate observations	Share the data with the calibration team.
APPID	A02050034	Title	HXMT 对银道面弥散辐射和大尺度结构的探测研究	PI	Dr. JuGuan
ABSTRACT	银河系大尺度“脊”结构及弥散辐射高度集中于银道面上，银道面小天区扫描刚好完整覆盖这些区域。充分利于银道面的扫描数据，除了可以对河内硬 X 射线辐射变源进行最深的普查，编制源表及发现瞬变源，预期还可以：（1）给出度量级弥散辐射的流强空间分布，从而为邻近点源提供高精确的本底估计，提高 X 射线辐射源表的可靠性和瞬变源发现的概率；（2）绘制银道面“脊”结构大尺度弥散辐射的天图。				
Target	Rank	Exposure Time (ks)	ToO?	Note1	Note2

Cygnus Loop	B	80	No	Small Area Scan	
Vela SNR	B	120	No		