The selected proposals with approved observations:

(1) Core proposals

Title	致密天体高能辐射性质研究				
ABSTRACT	核心提案基于慧眼的宽波段观测优势，以及目前慧眼已经积累的观测数据，在宽能区研究致密天体高能辐射性质，在爆发源和持续亮源等方面预期开展一系列的观测和研究，具体包括：X 射线双星爆发的时变、能谱以及态演化的研究；与大质量 X 射线双星爆发有关的极冠区的吸积辐射机制、辐射区几何以及回旋吸收研究；热核暴探针研究；Z 和 atoll 源的演化研究。提案包括常规的定点观测以及 ToO 观测，这些观测一部分作为已有慧眼相关源研究的观测补充，也可能通过 ToO 观测给出新现象的发现。观测的实施将有助于推进不同类型 X 射线双星的辐射机制等方面的研究。				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note

P0504133	1A_0535+26	1200	B	YES	
P0504134	1A_1118-615	1200	B	YES	
P0504135	2S_1417-624	1200	B	YES	
P0504136	2S_1553-542	1200	A	YES	
P0504137	2S_1845-024	1200	A	YES	
P0504138	3A_0114+650	1200	A	YES	
P0504139	4U_0115+634	1200	A	YES	
P0504140	4U_1538-52	1200	A	YES	

P0504141	4U_1543-47	1500	A	YES	
P0504142	4U_1608-52	300	B	YES	
P0504143	4U_1626-67	1200	A	YES	
P0504144	4U_1630-472	1500	A	YES	
P0504145	4U_1636-53	300	A	YES	
P0504146	4U_1700-377	1200	A	YES	
P0504147	4U_1822-371	1200	A	YES	
P0504148	4U_1901+03	1200	A	YES	

P0504149	4U_1907+09	1200	A	YES	
P0504150	4U_1908+075	1200	A	YES	
P0504151	4U_2206+54	1200	B	YES	
P0504152	Aql_X-1	300	A	YES	
P0504153	Cen_X-3	100	A	YES	
P0504154	Cep_X-4	1200	A	YES	
P0504155	Cir_X-1	200	A	YES	
P0504129	Cyg_X-1	360	A	NO	

P0504156	Cyg_X-1(ToO)	360	A	YES	
P0504157	Cyg_X-2	300	A	YES	
P0504158	Cyg_X-3	170	A	YES	
P0504159	EXO_0331+530	1200	B	YES	
P0504160	EXO_1846-031	1500	A	YES	
P0504161	EXO_2030+375	1200	A	YES	
P0504162	Ginga_0834-430	1200	A	YES	
P0504163	GRO_J1008-57	1200	A	YES	

P0504164	GRO_J1655-40	1500	A	YES	
P0504166	GRO_J1744-28	1200	B	YES	
P0504165	GRO_J1750-27	1200	A	YES	
P0504167	GRO_J2058+42	1200	A	YES	
P0504168	GRS_1915+105	170	A	YES	
P0504169	GX_1+04	1200	A	YES	
P0504170	GX_3+01	100	A	YES	
P0504172	GX_301-02	200	A	YES	

P0504171	GX_304-01	1200	A	YES	
P0504173	GX_339-04	1500	A	YES	
P0504174	GX_9+01	100	A	YES	
P0504175	H_1743-322	1500	A	YES	
P0504176	Her_X-1	1200	A	YES	
P0504177	IGR_J16393-4643	1200	A	YES	
P0504178	IGR_J17544-2619	1200	A	YES	
P0504179	IGR_J18027-2016	1200	A	YES	

P0504180	IGR_J18179-1621	1200	A	YES	
P0504181	IGR_J19294+1816	1200	A	YES	
P0504182	KS_1947+300	1200	A	YES	
P0504183	MAXI_J1348-630	1500	A	YES	
P0504184	MAXI_J1409-619	1200	A	YES	
P0504185	MAXI_J1535-571	1500	A	YES	
P0504186	MAXI_J1631-479	1500	A	YES	
P0504187	MAXI_J1820+070	1500	A	YES	

P0504189	MXB_0656-072	1200	A	YES	
P0504188	MXB_1730-33	300	A	YES	
P0504191	new source 1	600	A	YES	
P0504190	new source 2	600	A	YES	
P0504192	new source 3	600	A	YES	
P0504193	RX_J0209.6-7427	1200	A	YES	
P0504194	RX_J0440.9+4431	1200	A	YES	
P0504195	SAX_J2103.5+4545	1200	A	YES	

P0504196	SWIFT_J0243.6+6124	1200	A	YES	
P0504197	SWIFT_J0513.4-6547	1200	A	YES	
P0504198	SWIFT_J1626.6-5156	1200	A	YES	
P0504199	SWIFT_J1728.9-3613	1500	A	YES	
P0504200	SWIFT_J1845.6+0051	1200	A	YES	
P0504201	V404_Cyg	1500	A	YES	
P0504202	Vela_X-1	200	B	YES	
P0504203	SWIFT_J0541.5-6826	1200	A	YES	

P0504204	XTE_J0658-073	1200	A	YES	
P0504205	XTE_J1550-564	1500	A	YES	
P0504206	XTE_J1650-500	1500	A	YES	
P0504207	XTE_J1701-462	1000	A	YES	
P0504208	XTE_J1752-223	1500	A	YES	
P0504209	XTE_J1817-330	1500	A	YES	
P0504210	XTE_J1829-098	1200	A	YES	
P0504211	XTE_J1858+034	1200	A	YES	

P0504212	XTE_J1859+226	1500	A	YES	
P0504213	XTE_J1946+274	1200	A	YES	
Title	Galactic Plane Scanning Survey with Insight-HXMT				
ABSTRACT	Hard X-ray Modulation Telescope (Insight-HXMT), the first Chinese X-ray space telescope launched on June 15, 2017, has three telescopes with different energy bands, i.e., High Energy X-ray Telescope (HE: 20-250 keV), Medium Energy X-ray Telescope (ME: 5-30 keV), and Low Energy X-ray Telescope (LE: 1-15 keV). Galactic plane scanning survey is one of the most important missions of Insight-HXMT, which will take about 1/3 of the total observation time of Insight-HXMT. Thanks to the large efficient area and narrow field of view in hard X-ray band, Insight-HXMT has more capabilities than any other X-ray telescope to make the Galactic plane scanning survey of weak variable sources, and will give us the deepest and highest frequency census of the Galactic hard X-ray variable sources. With the Galactic plane scanning survey, Insight-HXMT can make longterm monitoring of many variable X-ray sources (e.g., accreting black holes and neutron stars), by obtaining their light-curves at different time scales, as well as finding some new X-ray sources. In addition, taking advantages of the good energy resolution of Insight-HXMT/LE and the high frequency of scanning, we can obtain the high-precision spectra of				

	diffuse background in different regions of Galactic plane, and construct a sky map of the Galactic diffuse background.				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0501024	SAS_190439-045817_7	-	A	NO	
P0501025	SAS_182735-001346_7	-	A	NO	
P0501026	SAS_184629-135203_7	-	A	NO	
P0501027	SAS_180853-090203_7	-	A	NO	

P0501028	SAS_182728-224451_7	-	A	NO	
P0501029	SAS_174841-174156_7	-	A	NO	
P0501030	SAS_180627-313242_7	-	A	NO	
P0501031	SAS_172550-260812_7	-	A	NO	
P0501032	SAS_174147-401004_7	-	A	NO	
P0501033	SAS_165852-341312_7	-	A	NO	
P0501034	SAS_171053-482751_7	-	A	NO	
P0501035	SAS_162543-414502_7	-	A	NO	

P0501036	SAS_162917-560926_7	-	A	NO	
P0501037	SAS_154339-482436_7	-	A	NO	
P0501038	SAS_060745+201724_7	-	A	NO	
P0501039	SAS_051929+371854_7	-	A	NO	
P0501040	SAS_064605+023632_7	-	A	NO	
P0501041	SAS_040428+522512_7	-	A	NO	
P0501042	SAS_072318-150832_7	-	A	NO	
P0501043	SAS_015217+620201_7	-	A	NO	

P0501044	SAS_080727-322632_7	-	A	NO	
P0501045	SAS_230431+230431_7	-	A	NO	
P0501046	SAS_091201-481946_7	-	A	NO	
P0501047	SAS_211201+481946_7	-	A	NO	
P0501048	SAS_110431-600934_7	-	A	NO	
P0501049	SAS_200727+322632_7	-	A	NO	
P0501050	SAS_135217-620201_7	-	A	NO	
P0501051	SAS_192318+150832_7	-	A	NO	

P0501052	SAS_160428-522512_7	-	A	NO	
P0501053	SAS_184605-023632_7	-	A	NO	
P0501054	SAS_171929-371854_7	-	A	NO	
P0501055	SAS_180745-201724_7	-	A	NO	
P0501056	SAS_164658-451446_7	-	A	NO	
P0501057	SAS_150715-581751_7	-	A	NO	
P0501058	SAS_122548-624332_7	-	A	NO	
P0501059	SAS_100000-550259_7	-	A	NO	

P0501060	SAS_083553-403949_7	-	A	NO	
P0501061	SAS_074354-235325_7	-	A	NO	
P0501062	SAS_070422-061713_7	-	A	NO	
P0501063	SAS_062731+112919_7	-	A	NO	
P0501064	SAS_054537+285610_7	-	A	NO	
P0501066	SAS_044658+451446_7	-	A	NO	
P0501067	SAS_030715+581751_7	-	A	NO	
P0501068	SAS_002548+624332_7	-	A	NO	

P0501069	SAS_220000+550259_7	-	A	NO	
P0501070	SAS_203553+403949_7	-	A	NO	
P0501071	SAS_194354+235325_7	-	A	NO	
P0501072	SAS_190422+061713_7	-	A	NO	
P0501073	SAS_182731-112919_7	-	A	NO	
P0501074	SAS_174537-285610_7	-	A	NO	

(2) Guest proposals

Title	利用慧眼和 FAST 对伽马射线双星 LS I +61 303 进行联合监测	PI	Dr. Shan-ShanWeng

ABSTRACT	从 1978 年发现至今，伽马射线双星 LS I +61 303 中致密天体的类型一直存在争议。近期，我们利用 FAST 在 LS I +61 303 方向首次探测到周围为 0.269 秒的射电脉冲信号，说明系统中很可能存在年轻的脉冲星。此外，我们还在其中探测到 44 次明亮的单脉冲，它们与在其它已知脉冲星中所观测到的单脉冲完全不同。本项目计划利用慧眼卫星与 FAST 对伽马射线双星 LS I +61 303 在不同轨道相位处进行同时性监测，希望获得系统中致密天体及其所处环境的关键性质。				
Special requirement	Coordinated observations.				
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0503075	LS_I_+61_303	150	A	NO	
Title	基于慧眼和丽江 2.4 米光学望远镜联合观测研究 X 射线吸积脉冲星磁场及光学性质		PI	Dr. Xian Hou	

ABSTRACT	申请人拟利用慧眼观测数据系统地对大质量 X 射线吸积脉冲星爆发过程的不同阶段进行脉冲最高能量搜索，通过比较爆发过程中不同光度下的高低能脉冲来确定是否发生了由铅笔型模式主导到风扇型模式主导的转变，确定转变时的临界光度 Lcrit，从而来更好地估算中子星的磁场。提案类型为 ToO，触发标准为 Swift/BAT 或 MAXI 流量大于 100 mCrab，其中最弱的三颗源触发流量为 50 mCrab。慧眼具有大有效面积、观测能段更宽和更高的优势。X 射线吸积脉冲星是慧眼的重点和长期观测对象。利用慧眼定点观测模式，本提案可获得宽能段、高时间分辨率、良好能量分辨率的高统计性和高频次观测数据，尤其是在高能段，慧眼具有其它 X 射线卫星无法比拟的独特优势，是目前唯一可以进行脉冲最高能量搜索的在轨卫星。申请人拟利用云南天文台丽江 2.4 米光学望远镜及其它地面光学望远镜对爆发进行联合观测，研究 Lcrit 前后吸积盘的性质，以及 X 射线辐射对伴星的影响。				
Special requirement	Coordinated observations.				
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504076	1A_0535+26	600	A	YES	

P0504077	2S_1417-624	600	A	YES	
P0504078	4U_1901+03	600	A	YES	
P0504079	4U_0115+63	600	A	YES	
P0504080	Cen_X-3	600	A	YES	
P0504081	GRO_J1008-57	600	A	YES	
P0504082	RX_J0209.6-7427	600	A	YES	
P0504083	New source	600	A	YES	
P0504084	IGR_J19294+1816	600	A	YES	

P0504085	XTE_J1946+274	600	A	YES	
P0504086	GRO_J1750-27	600	A	YES	
P0504087	GX_301-02	600	A	YES	
P0504088	Vela_X-1	600	A	YES	
P0504089	SWIFT_J0243.6+6124	600	B	YES	
P0504090	SWIFT_J1700.8-4139	600	A	YES	
Title	Measuring the Broad Band X-ray Emission of Millisecond X-Ray Pulsars in Outburst			PI	Dr. ZhaoshengLi

ABSTRACT	We propose to perform ten 20 ks HXMT target of opportunity (ToO) observations of a transient millisecond X-ray pulsar in outburst. The target can be either one of the twenty known transient accreting millisecond X-ray pulsars (AMXPs) under going a new outburst, or a “newly” discovered object of this class. These observations will allow us to study the broad band spectrum in detail, from hard to soft X-ray energies, as well as the timing properties or eclipsing features of the source during its outburst. The high signal-to-noise spectral information will make it possible to disentangle the contributions of soft black body, reflection (if any), and hard Comptonized spectral components. Moreover, we may detect type-I X-ray bursts, and/or for the first time also burst oscillations at high-energy (if present). The observations will also allow a timing analysis to study the pulse profile, time lags and pulsed spectrum, and will thus provide important constraints on emission mechanisms.				
Special requirement	One of the twenty-one sources will be triggered if scientifically justified.				
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504091	New AXMP	200	A	YES	
P0504092	IGR_J17494-3030	200	A	YES	

P0504093	IGR_J17498-2921	200	A	YES	
P0504094	MAXI_J0911-655	200	A	YES	
P0504095	IGR_J17591-2342	200	A	YES	
P0504096	IGR_J18245-2452	200	A	YES	
P0504097	IGR_J17062-6143	200	A	YES	
P0504098	SWIFT_J1749.4-2807	200	A	YES	
P0504099	IGR_J17511-3057	200	A	YES	
P0504100	SWIFT_J1756.9-2508	200	A	YES	
P0504101	HETE_J1900.1-2455	200	A	YES	
P0504102	IGR_J00291+5934	200	A	YES	
P0504103	IGR_J17379-3747	200	A	YES	

P0504104	NGC_6440_X-2	200	A	YES	
P0504105	IGR_J16597-3704	200	C	YES	
P0504106	SAX_J1748.8-2021	200	A	YES	
P0504107	XTE_J1814-338	200	A	YES	
P0504108	XTE_J1807-294	200	A	YES	
P0504109	XTE_J0929-314	200	A	YES	
P0504110	XTE_J1751-305	200	A	YES	
P0504111	SAX_J1808.4-3658	200	A	YES	

Title	4U 0115+63 中谐频回旋线超临界光度附近的性质研究	PI	Dr. LingdaKong

ABSTRACT	4U 0115+63 是经典的吸积脉冲星，其中子星的磁场根据基频回旋吸收线的测量约为 1.1-1.4 亿特斯拉。由于其基频回旋线能量的能量较低（12 keV）。因此，能谱回旋线的高次谐波结构也十分显著，使得 4U 0115+63 成为了目前为止具有谐频级数最多的源（最高可到 5 阶线）。由于回旋线高次谐频线具有和基频线不同的性质，例如共振散射截面在相同夹角（辐射方向于磁场方向）但不同的共振能级下具有显著的区别；以及谐波线可能与基频线来自于吸积柱不同的区域等。通过研究该源中谐波线能量、宽度、吸收深度和脉冲相位，光度等之间的关系，可以进一步给出吸积区的几何。尤其是该源作为一个经典的暂现源，虽然历经多次爆发，在光度超过临界光度的区域，基频回旋线与光度的相关性依然未明。其中的原因可能是因为该源中高次谐波的吸收对基频线心能量、宽度和吸收深度的测量都造成了严重影响。通过慧眼高能大面积的优势和对亮源的持续监测能力，在今后的爆发中，通过研究高次谐波线的性质，来研究超临界光度区域的吸积性质则变得尤为重要。				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504128	4U_0115+63	100	B	YES	

Title	Probing the accretion regimes in transient accreting pulsars		PI		Dr. PabloReig
ABSTRACT	We request Insight-HXMT Target of Opportunity (ToO) observations of one transient accreting pulsar. We aim to obtain a sufficient number of high signal-to-noise snapshots of these kind of sources at different accretion states as they go through a giant X-ray outburst. Our principal goal is to study the timing and spectral parameters as a function of luminosity. This will allow us to test accretion models and characterize with unprecedented detail the X-ray spectral continuum at the two most important accretion regimes (super-critical and sub-critical). We will also test whether the complex and elusive critical luminosity can be estimated from the observations.				
Special requirement	One of the five sources will be triggered if scientifically justified.				
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504214	1A_1118-615	300	A	YES	

P0504215	4U_0115+63	300	B	YES	
P0504216	EXO_0331+530	320	A	YES	
P0504217	KS_1947+300	320	B	YES	
P0504218	XTE_J1946+274	300	B	YES	

Title	吸积脉冲星连续谱光度演化研究	PI	Dr. LingdaKong
ABSTRACT	强磁场中子星通过磁场俘获伴星的吸积物质，并在极冠处根形成吸积区。根据光度（吸积率）的不同，吸积区的辐射模式可分为“铅笔”和“风扇”两种不同的模式，其分别对应着土丘和吸积柱这两种不同的吸积几何。而特征光度标注了吸积柱形成的位置。Reig 利用 RXTE 的数据对 9 个源进行了系统的研究，发现能谱中非热幂率成分的谱指数和光度在特征光度前后具有相反的相关关系。通过这一属性，我们可以利用能谱参数光度演化特征来研究源的特征光度，验证吸积柱理论的正确性，测量磁场。本研究的目的是利用慧眼对吸积脉冲星更亮的爆发的能谱参数演化样本，并与 RXTE 的结果进行对比。系统地对比由回旋		

	线给出的磁场与连续谱测量给出的磁场的差异，验证吸积柱理论的正确性。我们期望观测到超过临界光度的爆发，并通过回旋线于连续谱方法来研究吸积柱理论和特征光度大小之间的关系。				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504219	4U_1901+03	100	B	YES	
P0504220	GRO_J1008-57	100	A	YES	
Title	利用光球扩展 X 射线暴研究 X 射线双星的吸积物理过程		PI	Dr. Yu-PengChen	

ABSTRACT	X 射线暴是发生在 X 射线双星系统中秒量级的耀发，其最高光度可达爱丁顿光度。发生在中子星表面的热核爆被称为一型 X 射线暴，RXTE 卫星最早发现了热核爆期间引力能辐射的变化，NICER 和 Insight-HXMT 在单个热核暴中确认了热核暴期间引力能辐射强度可以增加近十倍，但都基于引力能辐射谱形不变这一前提，而这一前提和热核暴期间硬 X 射线辐射缺失这一现象矛盾。 最近 Insight-HXMT 在单个暴中也发现了硬 X 射线辐射超出。这一矛盾可能通过 NICER 和 Insight-HXMT 的联合观测得以解决，利用这两个卫星在软 X 射线和硬 X 射线能段的联合观测，给出暴期间吸进能谱形的变化，以此给出热核暴对吸积环境的影响。二型 X 射线暴有着更频繁的暴发频率和更复杂的光变能谱特性，在黑洞双星和活动星系核中发现的硬 X 射线延迟也在中子星系统的二型 X 射线暴中被发现（Chen et al 2021），可能代表着在跨越致密性系统和数量级质量的系统中有着的相同的辐射机制，通过慧眼的高频观测和其他卫星的联合观测，可能给出在硬 X 射线延迟现象中三类系统的共同的辐射机制。
Special requirement	

Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504221	4U_0614+091	300	A	YES	

P0504222	4U_1608-52	300	A	YES	
P0504223	4U_1636-53	300	B	YES	
P0504224	4U_1728-34	300	A	YES	
P0504225	4U_1820-303	300	A	YES	
P0504226	Aql_X-1	300	C	YES	
P0504227	Cyg_X-2	300	B	YES	
P0504228	MXB_1730-33	300	B	YES	

Title	Black holes transitions: insight-hxmt and multiwavelength	PI	Dr. QingcuiBu

ABSTRACT	Despite decades of research, fundamental questions remain unanswered: what fractions of accretion mass and energy are released into the local environs by jets; and how does the accretion process lead to the launching of jets? Simultaneous multi-wavelength observations are the optimal tool that exposes this view. However, these campaigns (connecting the evolving accretion inflow and jet outflow) have been rarely achieved. Black hole X-ray binaries (BHXBs) provide ideal laboratories for probing jet phenomena as they cycle through different accretion states on timescales of days to months. We request a ToO consisting of three 10 ks insight-HXMT visits of a BHXB as it transitions from the hard to the soft state to complement NICER/INTEGRAL coverage. Our target list contains 5 candidates. We target the transition to reveal both the rapid orbit-to-orbit X-ray variability and the slower X-ray variability that characterize the significantly changing accretion disk (derived from Xray spectra and timing).				
Special requirement	Coordinated observations, one of the seven sources will be triggered if scientifically justified.				
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504229	GX_339-04	300	A	YES	
P0504230	H_1743-322	300	A	YES	

P0504231	MAXI_J1348-630	300	A	YES	
P0504232	MAXI_J1535-571	300	A	YES	
P0504233	MAXI_J1820+070	300	A	YES	
P0504234	News source	300	A	YES	
P0504235	SWIFT_J1658.2-4242	300	A	YES	

Title	黑洞 X 射线双星爆发过程中冕的几何结构和演化	PI	Mr. JingqiangPeng
ABSTRACT	吸积过程为天体由于引力作用而吸引和积聚周围气体、尘埃等物质的过程。吸积过程在双星尤其是 X 射线双星中有重要作用。在黑洞双星系统中，黑洞通过洛希瓣吸积半星物质，在黑洞周围形成吸积盘。吸积过程把吸积物质的引力能转化为盘、冕/喷流的辐射能。盘、冕/喷流又是研究爆发演化过程中的核心成分。黑洞爆发演化的主要特点是谱态随吸积率的变化，这种变化又和盘、冕之间的转化有关，而不同谱态		

	下盘、冕的具体的几何结构和演化并不清楚。慧眼 X 射线能区具有宽波段、大面积、高时间和能量分辨的优势适用于亮源观测 。通过慧眼对黑洞 X 射线双星爆发期间进行完整的监测，获得黑洞 X 射线双星爆发演化的完整的数据，然后对数据进行时变和能谱分析来研究黑洞 X 射线双星爆发期间冕的几何结构和演化。				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504236	MAXI_J1535-571	200	B	YES	
Title	黑洞暂现源低频准周期调制现象观测提案申请		PI	Mr. ZixuYang	

ABSTRACT	黑洞暂现源 4U 1630-472 是一个发现历史悠久，同时具有丰富的时变和能谱变化特征的源。其最为突出的爆发特征是周期为 600 天左右的准周期性的爆发活动，自从 2021 年 9 月此源进入了一次中等强度的爆发（峰值流量~500mCrab）之后，预计此源会在 2023 年 5 月份左右进入下一次爆发活动。 同时，4U 1630-472 在以往的观测中缺少低硬态/硬中间态的观测数据支持，因此需要在爆发的早期安排密集的观测计划集中捕捉此源在低硬态/硬中间态的演化特征。 更为重要的是，4U 1630-472 在 1998 年和 2021 年的爆发中，在相同的光度（~200mCrab）处，均出现了周期为 16s 的准周期调制现象，这种现象是光度依赖的，预计形成机制与传统的 C 型 QPO 具有不同的物理起源。在下一次爆发过程中，通过密集观测以期望再次在相同光度处捕捉到此低频准周期调制现象，对于我们研究吸积盘和冕的不稳定性过程具有重要的意义。				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0505237	4U_1630-472	300	B	YES	

Title	Hunting for cyclotron resonance scattering features in three accreting pulsars		PI	Dr. LorenzoDucci	
ABSTRACT	We propose to observe three high-mass X-ray binaries containing pulsars to perform spectral and timing analysis with the main aim to search for cyclotron resonance scattering features in their average and phase-resolved spectra. In addition, we will exploit the broadband capabilities of Insight-HXMT to constrain the physical interpretations of the spectra observed, study the pulse profile variability and energy dependency, and search for quasi-periodic oscillations in their power spectra. All these measurements will allow us to gain fundamental information to understand the accretion geometry of these binary systems, also in the broader context of the overall population of accreting pulsars in high-mass X-ray binaries.				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504239	EXO_2030+375	200	B	YES	

P0504240	KS_1947+300	200	C	YES	
P0504241	XTE_J1859+083	200	A	YES	
Title	Crab 和 J1846-0258 两颗脉冲星周期跃变和强磁场脉冲星暴发研究		PI	Dr. MingyuGe	
ABSTRACT	通过射电和 Atel 信息，监测 Crab 和 J1846-0258 两颗脉冲星的周期跃变，已经可能的星云流量变化，详细研究脉冲星的周期跃变或者星云流量变化之后，脉冲星的计时特征、脉冲轮廓演化和制动指数的演化情况，研究脉冲星磁场变化的可能性。J1846-0258 存在类似磁星的暴发时，与 FAST 联合观测研究宽波段能谱演化和周期的规律以及与射电的变化行为。				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note

P0504005	Crab	100	A	YES	
P0504006	PSR_J1846−0258	200	A	YES	

Title	MAXI J1409-619 中多阶回旋吸收线的性质研究	PI	Dr. LingdaKong
ABSTRACT	MAXI J1409-619 是 MAXI 卫星在 2010 年发现的吸积脉冲星，周期为 500s，但爆发流量较低。自那之后，该源到现在为止没有明显的爆发现象。BeppoSAX 卫星在该源爆发期间发现该源能谱中有三个吸收线结构，分别在 44 keV，73 keV，和 128 keV,但他们之间的关系并不服从回旋吸收线的各级共振能量之间的关系。在本研究中，我们期待利用慧眼在 30-250 keV 大面基的探测优势，来研究该源在未来爆发（尤其是二型爆发）中回旋线随光度，各能级随相位的趋势，并且确认目前最高能量的二阶 128keV 回旋线的存在以及其随相位变化的性质和 1A0535+262 中 100keV 的一阶谐频是否具有相同的性质。以及确认多个吸收线结构之间的关系。		
Special requirement			

Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504242	MAXI_J1409-619	200	B	YES	

Title	通过 H1743-322 爆发初期观测探究成功爆发与失败爆发差异	PI	Dr. Peng-JuWang

ABSTRACT	H 1743-322 是经典的黑洞 X 射线暂现源。其倾角由射电观测给出约为 75 度，是研究高倾角黑洞系统性质的典型源。H 1743-322 每隔 200 天左右会经历一次爆发。其爆发包含进入 HS 的成功爆发和未能进入 HS 的失败爆发。通过之前慧眼对其 2018 年失败爆发的分析，发现其失败爆发的 LHS 能完美衔接成功爆发的演化。但是对此源成功爆发的 LHS 初期一直缺乏观测。因此对其爆发的监测，尤其是低硬态初期的观测对于认知失败爆发和成功爆发的性质尤为重要。

Special requirement	

Obs No.	Target	Exp. Duration	Grade	ToO?	Note

P0504243	H_1743-322	400	B	YES	

Title	热核暴探针对冕冷却性质的研究	PI	Dr. Peng-JuWang

ABSTRACT	LXMB 系统中发生在中子星表面的热核暴现象已经具有很长的研究历史。但是近些年，一些研究表明热核暴可以用来当作探针研究致密性附近冕的性质（Chen et al. 2012, Ji et al. 2013）。一些源在热核暴期间被探测到高能光子的缺失（30 keV），被理解为热核暴产生的软光子对冕的冷却效应导致。因此对暴期间硬光子缺失现象的研究，成为探究冕性质的有效探针。Chen et al. (2018) 通过 4U 1636-536 单个暴的研究，充分证实慧眼卫星对开展热核暴探针的研究的独特优势。因此进一步对热核暴大样本的观测，对详细研究冕性质具有重大的科学意义。
Special requirement	

Obs No.	Target	Exp. Duration	Grade	ToO?	Note

P0504244	4U_1636-53	300	B	YES	
P0504245	4U_1705-44	300	A	YES	
P0504246	Aql_X-1	300	B	YES	
P0504247	SWIFT_J1829.5-2347	300	A	YES	
P0504248	IGR_J17473-2721	300	A	YES	
P0504249	KS_1731-260	300	A	YES	
Title	GRS 1915+105 在反常低流量态期间的短时标耀发研究		PI	Dr. LingdaKong	

ABSTRACT	GRS 1915+105 在 2018 年后结束了其持续几十年的亮 X 射线辐射和复杂的时变性质，进入到了一个低流量的硬态。同时，在刚进入这个态时，该源伴随着一系列的 X 射线和射电耀发。NICER，AstroSAT 都分别捕捉到了一些耀发，并且 NICER 发现耀发期间，能谱中会产生很强的铁吸收线。认为此时在硬态源的周围盘风或者物质。然而由于铁线没有明显的蓝移，很难确认此时盘风的产生的起源。同时 NICER 的窄能段也无法给出能谱的其他信息。而慧眼卫星在 2019 年 6 月 2 日捕捉到的了目前所有耀发中最亮的一次。凭借宽能段的能谱分析，Kong et al. 2021 在耀发期间给出了能谱演化，发现随着耀发的流量下降，能谱中的喷流成分变弱，并且在铁线附近产生蓝移的吸收线。这一发现证明了耀发期间，源在短时标从喷流主导变成盘风主导，而这种快速变化只能说明喷流和盘风都来源于磁场驱动。而喷流与与盘风的区别是由于吸积盘距离黑洞远近不同导致的。当盘距离黑洞很近，盘上的大尺度磁场被准直，形成喷流；而当盘远离黑洞时，磁场从准直变得发散，并驱动盘风的形成。 可惜的是，慧眼对于这次耀发，只观测到了其下降阶段。我们需要进一步积累样本，获得更多完整地耀发，以探究盘风和喷流的演化过程。同时，对于一些 NICER 看到的较弱的爆发，在整个爆发的峰值期间依然有吸收线。我们需要慧眼的宽能谱数据来进一步研究喷流产生的条件。比如只有足够亮的耀发才能有更大的吸积率使盘更高进黑洞并使得磁场被准直。当源再次产生一系列 X 射线耀时，我们将利用慧眼宽能段观测数据，通过能谱分析给出磁场形状的快速变化的详细过程，这对我们理解吸积盘上的磁场形成机制和喷流的产生机制至关重要。

Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504250	GRS_1915+105	30	A	YES	
Title	Bursting Pulsar 中的二型 X 射线暴		PI	Dr. LongJi	
ABSTRACT	GRO J1744-28 是低质量 X 射线双星系统，由于其中存在二型 X 射线暴，被称为“bursting pulsar”。目前对该源二型暴的研究主要依 赖于 outburst 下降阶段的观测，而对 outburst 上升阶段的观测甚少。我们申请慧眼卫星的 ToO 观测，即当该源处于活动状态时（Swift BAT 流量大于 10mCrab），每 2 天进行 10ks 的观测，共进行 10 次观测。通过对该源上升阶段的观测，我们将研究二型暴的形态（尤其在 outburst 上升阶 段），并研究其与连续谱的关系，限制二型暴产生的物理机制。				

Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504251	GRO_J1744-28	200	A	YES	
Title	Understanding states and state transitions in black hole X-ray binaries through monitoring of Cygnus X-1		PI	Mr. MengleiZhou	
ABSTRACT	Blackhole X-ray binaries change between different accretion and emission regimes, the so-called states. While it is clear that states correspond to different accretion geometries - configurations of jets, accretion disk, corona, and accretion disk winds - neither the exact morphology of the accretion/ejection flows nor what triggers state transitions is clear. In particular, the origin of the hard emission (corona or jets?) remains a mystery. We propose monitoring the prototypical black hole X-ray binary Cygnus X-1 in order to trace the behavior of the different source components through different states, with a particular focus on energy-dependent timing studies and HXMT's unique capabilities to measure variability at high energies and unique broadband energy coverage. Cygnus				

	X-1 is a persistent source that often crosses the so-called jet-line between the hard and soft state, where the most dramatic changes in accretion geometry are thought to take place. It is thus best suited for such monitoring. Also, it is found that Cygnus X-1 is more stable in the hard state and the soft state, while less stable in the intermediate state. The origin of the stability of the two states is also an interesting open question waiting to be answered. We note that this is a continuation of a successful observing program from AO3 and AO4.				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0505127	Cyg_X-1	180	B	NO	
Title	重返硬态的 clocked burster 研究		PI	Dr. LongJi	

ABSTRACT	GS 1826-238 是低质量 X 射线双星系统，由于存在准周期性的 X 射线暴，被称为 clocked burster。该源的爆发演化与大多数源不同，长期处在较为稳定的状态。该源在 2014 年前处在“硬态”，随后进入了一个反常状态，与常见的“中间态”类似。申请人建议在该源重新回到“硬态”后，进行 36ks 的连续定点观测。提案类型为 ToO，触发标准为 Swift/BAT 流量大于 100mCrab。申请人拟通过该源的宽波段能谱、X 射线暴形态与等待时标，研究不同吸积率情况下的盘-冕结构，以及 X 射线暴的点火理论。				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504252	4U_1826-24	36	A	YES	
Title	Broadband HFQPOs study in GRS 1915+105		PI	Dr. QingcuiBu	

ABSTRACT	The rapid variability of X-ray emission arises from the process of accretion onto compact objects, which has provided unique insights into the accretion physics under the strong gravity field. Despite decades of research on high frequency quasi-periodic oscillations (HFQPOs), their origin remains unclear: how does the accretion process lead to the production of HFQPOs? Where does the signal come from? from disk or corona? Recent AstroSat observations of GRS 1915+105 have revealed HFQPOs related to an oscillating "compact" corona. In order to investigate the origin of HFQPOs, it is essential that we study fast variability in broader and higher energy band. We request a ToO consisting of a 30 ks visit of GRS 1915+105 for at least 10 days when the source flux exceeding 0.3 Crab both in the "softer" (8-30 keV) and the "harder" band (25-100 keV). We target the δ,κ,ω,γ X-ray variability classes where HFQPOs are frequently observed in this source.				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504253	GRS_1915+105	20	B	YES	

Title	中子星 X 射线双星的观测研究		PI		Ms. QiLiu
ABSTRACT	中子星 X 射线双星的 X 射线研究是探索极强磁场和强引力下物理过程的重要工具，是慧眼卫星主要科学目标之一。为了更好的对中子星物理进行深入的研究，我们希望申请一下 4U 2206+54, 4U 0114+65, GX 301-2, Vela X-1，Cen X-3, 和 4U 0115+63 这几个源的进一步 HXMT 观测。通过计时分析和能谱分析研究它的轨道参数，自转演化，脉冲轮廓，可能存在的 QPO 现象，以及光谱指数，氢柱密度，回旋吸收线等能谱特征。这些分析可以帮助我们理解自转超慢的中子星（4U 2206+54, 4U 0114+65）的物理起源和演化过程以及 Vela X-1，Cen X-3 等系统中的吸积物理和辐射机制包括吸积状态转变等				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0505122	4U_0114+65	200	B	NO	

P0504280	4U_0115+63	100	B	YES	
P0505123	4U_2206+54	200	A	NO	
P0505126	Cen_X-3	100	B	NO	
P0505124	GX_301-02	200	B	NO	
P0505125	Vela_X-1	200	A	NO	

Title	黑洞 X 射线双星定点观测及演化研究	PI	Mr. XiaoChen
ABSTRACT	黑洞 X 射线在爆发时是全体最亮 X 射线源之一，其光变和能谱演化特征带给我们丰富物理信息，是研究黑洞物理，吸积和喷流，冕等物理本质及演化的重要工具。本观测基于 HXMT 的观测计划及时间与空间分辨情况，对目前可观测的几个黑洞X射线双星源的观测可行性分析。申请观测的源为黑洞X射线双星 Cyg		

	X-1、H 1743-322、IGR J17091-3624、GRS 1915+105、GX339-4 和 GRS 1758-258。对源的观测数据将用于光变、能谱分析等，并基于此对 X 射线黑洞双星的演化等方面进行研究。				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0505120	Cyg_X-1	100	B	NO	
P0505121	SWIFT_J1801.1-2544	100	A	NO	
P0504254	GRS_1915+105	100	A	YES	
P0504255	GX_339-04	100	B	YES	

P0504256	H_1743-322	100	B	YES	
P0504257	IGR_J17091-3624	100	C	YES	

Title	Optical/Infrared –X-ray Correlations in Low-Mass X-ray Binaries	PI	Dr. GuobaoZhang

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 are 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 propose a joint monitoring program between HXMT and the 2-m robotic Faulkes Telescopes. The Faulkes Telescope observations are part of an ongoing monitoring campaign of more than 50 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. 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.

Special requirement	Coordinated observations.				
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504258	1A_0620-00	300	A	YES	
P0504259	4U_1608-52	300	A	YES	
P0504260	Aql_X-1	300	A	YES	
P0504261	Cen_X-4	300	A	YES	
P0504262	GRO_J0422+33	300	A	YES	
P0504263	GRS_1009-45	300	A	YES	

P0504264	GRS_1124-68	300	A	YES	
P0504265	GS_1354-64	300	A	YES	
P0504266	GS_2000+25	300	A	YES	
P0504267	GX_339-04	300	A	YES	
P0504268	MAXI_J0556-332	300	A	YES	
P0504269	MAXI_J1348-630	300	A	YES	
P0504270	MAXI_J1659-152	300	A	YES	
P0504271	MAXI_J1836-194	300	A	YES	

P0504272	SWIFT_J1910.2-0546	300	A	YES	
P0504273	V404_Cyg	300	A	YES	
P0504274	XTE_J1650-500	300	A	YES	
P0504275	XTE_J1752-223	300	A	YES	
P0504276	XTE_J1859+226	300	A	YES	
P0504277	XTE_J2123-058	300	A	YES	
Title	An Insight-HXMT view of the disk wind in GRS 1915+105		PI	Dr. HonghuiLiu	

ABSTRACT	Disk wind is an important structure of the accretion flow. Study of the disk wind in the X-ray band relies on resolving the absorption line and the broadband continuum. Compared to other instruments, Insight-HXMT has the advantage to resolve the absorption structure and the broadband continuum simultaneously. We propose 5 HXMT observations on GRS 1915+105 if the source goes into a spectrally soft state to study the physical properties of the wind. We require 30 ks exposure for each observation. We will also investigate how the wind can respond to the variation of the ionizing spectrum. By doing these, we expect to provide more clues on the physical origin of the disk wind.				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504278	GRS_1915+105	150	B	YES	
Title	An Insight-HXMT view of the galactic ultraluminous X-ray pulsar swift J0243.6+6124		PI	Dr. HonghuiLiu	

ABSTRACT	Five Insight-HXMT observations each with 30 ks exposure are requested to observe the next out- burst of the Galactic ultraluminous X-ray pulsar Swift J0243.6+6124. We require to trigger these observations when the MAXI-GSC (2–20keV) count rate is higher than 4 ct/s/cm^2. These observations will enable studies of: (1) the evolution of the broad iron line from sub-Eddington to super- Eddington accretion regime (2) the geometry of the innermost accretion region at different accretion rates (3) the strength of the magnetic field.				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504279	SWIFT_J0243.6+6124	150	A	YES	
Title	FAST and Insight-HXMT monitoring campaign for high-B pulsars and magnetars		PI	Dr. LongJi	

ABSTRACT	Motivated by the association of the Galactic FRB200428 and X-ray burst with the magnetar SGR J1935+2154, we propose a monitoring program of joint Insight-HXMT and FAST observations for four canonical high-B pulsars and magnetars, i.e., PSR J1852+0040, 3XMM J185246.6+003317, SGR 0418+5729 and PSR J1846-0258. We request 12×5ks observational time for each source, for a total of 240ks for the entire project. This multi-wavelength campaign will not only have the potential possibility for detecting radio/X-ray counterparts of the latent high-B pulsars and magnetars, but will also greatly improve our understanding of the radiation mechanisms at play, and shed light on the similarities and differences between X-ray and radio band properties of these sources.				
Special requirement	Coordinated observations.				
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0503118	3XMM_J185246.6+003317	60	A	NO	
P0503116	PSR_J1846−0258	60	A	NO	
P0503119	PSR_J1852+0040	60	A	NO	

P0503117	PSR_J0418+5732	60	A	NO	
Title	A NICER Insight into Black Hole X-ray Binary Outbursts in the 0.5–250 keV Band		PI	Dr. JiachenJiang	
ABSTRACT	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.				
Special requirement	Coordinated observations, one of the six sources will be triggered if scientifically justified.				
Obs No.	Target	Exp. Duration	Grade	ToO?	Note

P0504281	1A_0620-00	400	A	YES	
P0504282	MAXI_J1659-152	400	A	YES	
P0504283	SWIFT_J1753.5-0127	400	A	YES	
P0504284	XTE_J1118+480	400	A	YES	
P0504285	XTE_J1817-330	400	A	YES	
P0504286	XTE_J1859+226	400	A	YES	
Title	磁星 X 射线爆发与快速射电暴的多波段机会目标（ToO）观测		PI	Dr. LinLin	

ABSTRACT	2020 年 4 月 28 日，HXMT 捕捉到来自的磁星 SGR J1935+2154 与快速射电暴成协的非热 X 射线爆发。证实了磁星爆发是快速射电暴的来源之一。而 FAST 没有探测到同一活跃期的 29 个 X 射线爆发的射电信号。说明磁星爆发产生射电辐射的条件非常严苛。事实证明 HXMT 得益于宽能段和高灵敏度是目前唯一可以区分磁星爆发辐射性质的观测设备。我们希望利用 HXMT 更多地观测磁星爆发活动尤其是联合 FAST 进行多波段联测，从而对磁星和快速射电暴的性质和起源进行更深入的研究。				
Special requirement	Coordinated observations.				
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504287	1E_1048.1−5937	50	A	YES	
P0504288	1E_1547.0-5408	50	A	YES	
P0504289	1E_161348-5055.1	50	A	YES	

P0504290	PSR_J1841-0456	50	A	YES	
P0504291	1E_2259+58.6	50	A	YES	
P0504292	PSR_J1708-4008	50	A	YES	
P0504293	3XMM_J185246.6+003317	50	A	YES	
P0504294	4U_0142+614	50	A	YES	
P0504295	AX_J1818.8−1559	50	A	YES	
P0504296	AX_J1845.0−0258	50	A	YES	
P0504297	CXOU_J010043.1−721134	50	A	YES	

P0504298	PSR_J1647-4552	50	A	YES	
P0504299	PSR_J1714-3810	50	A	YES	
P0504300	FRB_20211204	50	A	YES	
P0504301	FRB_220428	50	A	YES	
P0504302	LS_I_+61_303	50	A	YES	
P0504303	new source 1	50	A	YES	
P0504304	new source 2	50	A	YES	
P0504305	PSR_J0726-2612	50	A	YES	

P0504306	PSR_J1119−6127	50	A	YES	
P0504307	PSR_J1622−4950	50	A	YES	
P0504308	PSR_J1718−3718	50	A	YES	
P0504309	PSR_J1819−1458	50	A	YES	
P0504310	PSR_J1846−0258	50	A	YES	
P0504311	PSR_J0418+5732	50	A	YES	
P0504312	PSR_J0501+4516	50	A	YES	
P0504313	PSR_J0526-6604	50	A	YES	

P0504314	SGR_0755-2933	50	A	YES	
P0504315	SAX_J1635.8-4736	50	A	YES	
P0504316	SGR_1801−23	50	A	YES	
P0504317	PSR_J1808-2024	50	A	YES	
P0504318	SGR_1808−20	50	A	YES	
P0504319	SGR_1830-0645	50	A	YES	
P0504320	PSR_J1833-0831	50	A	YES	
P0504321	GBS_1900+14	50	A	YES	

P0504322	PSR_J1935+2154	50	A	YES	
P0504323	SGR_2013+34	50	A	YES	
P0504324	PSR_J1745-2900	50	A	YES	
P0504325	SWIFT_J1555.2-5402	50	A	YES	
P0504326	SWIFT_J1818.0-1607	50	A	YES	
P0504327	SWIFT_J1822.3−1606	50	A	YES	
P0504328	SWIFT_J1834.9−0846	50	A	YES	
P0504329	XTE_J1810−197	50	A	YES	

Title	关于黑洞 X 射线双星 QPO 性质的研究和时变模型的应用			PI	Dr. YuexinZhang
ABSTRACT	我们希望通过慧眼对黑洞 X 射线双星 GRS 1915+105 的观测数据，发掘可能存在的 QPO 信号，并对 QPO 的动力学性质和辐射性质进行研究。我们想要利用组内开发的时间依赖的康普顿模型，对 QPO 的辐射性质进行拟合，从而得到黑洞周围冕的几何信息。进一步，我们可以结合数据和模型对黑洞双星的吸积几何给出更好的描述。				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504330	GRS_1915+105	10	C	YES	
Title	A comprehensive high-energy study of the periodic repeater FRB 20180916B covering a full range of phases through a joint multi-wavelength approach			PI	Dr. CristianoGuidorzi

ABSTRACT	Fast Radio Bursts (FRBs) are radio bright, ms-long extragalactic transients of unknown origin that are the focus of a global multi-wavelength (MWL) community. Among the most promising candidates, magnetars occasionally undergo bursting high-energy activity that can be in excess of 1047 erg/s during the subsecond peak of a giant flare. The discovery of Galactic low-energy FRB20200428 emitted by SGR1935+2154 simultaneously with an X-ray burst provided further evidence for the magnetar-FRB connection. Among the 24 FRB repeaters currently known, not only is FRB20180916B (formerly known as FRB180916.J0158+65) one of the only two periodic sources (period of 16.33 ± 0.12 days), but at 149 Mpc it is also among the nearest ones with measured distance. While no emission other than radio has been unambiguously associated with extragalactic FRBs yet, only an extensive coordinated MWL monitoring of FRB20180916B during the expected radio burst active and radio quiet windows, which builds on and extends the past campaigns, can fully characterise a possible high energy source activity and try to identify the emission mechanism(s) among the several proposed. We aim to accomplish our MWL coverage by extending to out-of-radio peak activity windows, that would complement the campaigns that we carried out in AO3+AO4 around the expected radio peak times.				
Special requirement	Coordinated observations.				
Obs No.	Target	Exp. Duration	Grade	ToO?	Note

P0503115	FRB_20180916B	195	A	NO	

Title	比较黑洞 X 射线双星不同爆发过程来探究吸积流结构的演化	PI	Dr. QingcangShui

ABSTRACT	作为银河系内最重要的 X 射线源，X 射线双星是集具有强引力场、高物质密度、高磁场、高能辐射等特点于一身的天体。由于这些特点，其成为研究广义相对论、磁流体力学、吸积理论以及辐射机制等重要前沿物理问题的理想实验室（Frank et al. 2002）。 黑洞 X 射线双星（BHXB）由一颗恒星级黑洞和一颗正常恒星组成，黑洞从伴星吸积物质形成吸积盘并产生 X 射线辐射，辐射的光度取决于吸积率等因素（Esin et al. 1997）。BHXB 在不同的吸积态下表现出显著不同的光变特征和能谱性质（Remillard and McClintock 2006）。通过分析黑洞 X 射线双星在爆发过程中时变和能谱特征的演化规律，可以研究强引力场下的吸积流结构和辐射机制等物理内容。本提案申请利用慧眼-HXMT 对黑洞 X 射线双星 GX 339-4 和 H 1743-322 的爆发过程进行完整的、高密度的、宽能段的观测，结合过去 RXTE 时代对两个源积累的大量爆发样本，以期研究能谱和时变性质在两个源的不同爆发过程中的演化性质，细致分析它们的共性与差异，从而实现对黑洞源吸积几何以及 QPO 模型的限制。

Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504331	GX_339-04	100	B	YES	
P0504332	H_1743-322	100	B	YES	
Title	A joint multi-wavelength search for activity from nearby active fast radio burst repeaters		PI	Dr. CristianoGuidorzi	
ABSTRACT	Fast Radio Bursts (FRBs) are radio bright, ms-long extragalactic transients of unknown origin that are the focus of a global multi-wavelength (MWL) community. The discovery that outbursting Galactic magnetars occasionally emit sub-energetic FRBs that fill in the gap with their extragalactic powerful siblings, makes a fundamental case for MWL campaigns aimed to constrain the nature of FRB sources. So far, about 20% of known sources were seen to repeat and are ideal targets for MWL observations. Benefiting from the increasing sample of FRBs and soon from the				

	hundreds of FRBs to be announced by CHIME, we aim to use Insight-HXMT for a joint X-ray/radio/optical monitoring of nearby (z<0.1 or, in the absence of a redshift estimate, DME<100 pc cm-3) repeating FRBs (rFRBs) that become active. In particular, among the rFRBs currently known, we identified three very promising sources that match our requirements thanks to their favourable distance and/or radio active window: FRB20200120E, positionally compatible with M81 at 3.6 Mpc and with DM=88 pc cm-3, FRB20201124A (z=0.098) which recently gave some of the brightest FRBs yet detected, and FRB20181030A with one of the lowest DM (103 pc cm-3) of all known repeaters and whose likely host galaxy, NGC 3252, lies at 20 Mpc distance.				
Special requirement	Coordinated observations.				
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504333	FRB_20181030A	100	A	YES	
P0504334	FRB_20200120E	100	A	YES	
P0504335	FRB_20201124A	100	A	YES	

Title	利用慧眼卫星研究 I 型暴在 NS-LMXB 4U 1636-53 中的发生规律和随能态演化机制	PI	Mr. ZheYan
ABSTRACT	低质量中子星 X 射线双星(NS-LMXB) 4U 1636-53 是一颗典型的 Atoll 源，在 Color-color Diagram (双色图)上展现类似 C 形状的能谱演化图案。这颗源在不同的能谱态都观测到了 I 型 X 射线暴。 I 型暴强度，形状以及爆发长度随源吸积率的演化也随之改变。 随着 HXMT 宽能段观测的增加，I 型暴发生期间随时间演化的能谱无法用单一的黑体模型来描述，较大的残差主要出现在低能(< 3keV)和高能(>15keV)区域。这些现象可能是吸积盘反射和冕的冷却导致的。所以爆发阶段宽波段的能谱可以帮助我们研究吸积盘的反射和冕演化。 多峰结构的 I 型暴和 mHz QPO 也多次出现在这颗源中，使得 4U 1636-53 成为研究 I 型暴的绝佳 X 射线源。 本提案将基于慧眼-HXMT 对 4U 1636-53 进行高统计观测，通过研究高能 X 射线在不同能谱态下对 I 型暴的影响， 找出 I 型暴在这颗源中产生随能谱演化的规律。 通过更宽波段的观测，进一步研究 mHz QPO 以及多峰结构 I 型暴产生的物理机制。		
Special requirement			

Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0505114	4U_1636-53	360	A	NO	

Title	利用慧眼和 NICER 的联合观测研究黑洞 X 射线双星中功率谱的快速转换现象	PI	Dr. LiangZhang

ABSTRACT	快速光变现象是黑洞 X 射线双星的一个典型特征。在爆发过程中，时变性质会随着谱态演化，反映了吸积流/喷流的几何和动力学特性的变化，是我们研究恒星级黑洞周围物质的状态和运动规律，以及检验广义相对论效应在强场中预言的有利探针。在黑洞 X 射线双星不同阶段的功率密度谱中可以分解出不同类型的准周期振荡现象（QPO）以及宽带噪声成分。在一些目标源中发现了不同功率谱成分的快速转换现象，例如不同类型 QPO 的转换和 QPO 的快速消失/重现。对此类短时标快速变化的比较研究可以帮助我们更好地理解 QPO 和噪声的起源，以及吸积几何的演化和喷流的产生机制等重要问题。本提案计划利用慧眼和 NICER 卫星对功率谱快速转换现象的联合观测，通过比较转换前后宽波段能谱的变化，系统研究 QPO 的起源及触发条件，探讨吸积几何在转换期间的演化；同时结合多波段观测，研究 X 射线时变性质与射电喷流之间的关系。

Special requirement	Coordinated observations.				
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504336	H_1743-322	300	A	YES	
P0504337	New Source	300	A	YES	
P0504338	XTE_J1859+226	300	A	YES	
Title	Systematic study for high-mass X-ray binary 4U-1700-37 with Insight-HXMT		PI	Dr. ZuobinZhang	

ABSTRACT	4U 1700−37/HD 153919 is a high-mass X-ray binary (HMXB) discovered by the Uhuru satellite. Located at a distance of 1.9 kpc, 4U 1700−37 is powered by the dense stellar wind of the O6.5 Iaf+ supergiant HD 153919 (Jones et al. 1973; Mason et al. 1976). It is the hottest and most luminous optical companion known in HMXBs. The nature of the compact object in this system is still an open question. We propose a continuous 300ks Insight-HMXT observation of 4U 1700-37. 4U 1700-37 displays regular eclipses every 3.41 days, which are firmly associated with the orbital period. With 300ks, HXMT can monitor the object through the whole orbital period. We will investigate the variability in different energy band and potential QPO signal, and search evidence of the presence of intermittent pulsations and cyclotron absorption features. In addition, we will extract flux-resolved spectra at different flux and orbital phases, which will reveal the evolution of the spectra and physical scenario behind it. And beyond that, narrow emission lines, especially Fe Ka line, were reported in 4U 1700-37. We want to study the emission features and further study the accretion environment using the X-ray reprocessing at different orbital phases.				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0505113	4U_1700-377	300	B	NO	

Title	吸积 X 射线脉冲星中 mHz QPO 的基本性质研究和偏振联合观测		PI	Dr. RuicanMa	
ABSTRACT	吸积 X 射线脉冲星中 mHz QPO 的起源问题一直存在争议，获得宽能段、高统计和高频次的观测数据对于检验 mHz 的理论模型进而理解吸积 X 射线脉冲星中的吸积辐射过程至关重要。偏振观测是理解吸积 X 射线脉冲星的另外一个窗口，可以通过偏振观测限制辐射区几何。慧眼卫星具有宽能段、大有效面积的特点，而极光 2 计划是目前唯一在轨运行的 X 射线偏振探测设备。本提案申请慧眼卫星 450 ks 的 ToO 观测时间，与极光 2 计划联合观测 1 个吸积 X 射线脉冲星，研究其中 mHz QPO 的产生机制，并测量脉冲星的偏振度，从时变和偏振两个角度理解这类特殊天体的辐射物理过程。候选源为 Swift BAT 上 flux 接近或超过 1 Crab，且存在 mHz QPO 的 3 个吸积 X 射线脉冲星（V0332+53、GRO J1744-28、GX 304-1），观测总时长为 450 ks。				
Special requirement	Coordinated observations.				
Obs No.	Target	Exp. Duration	Grade	ToO?	Note

P0504339	EXO_0331+530	450	A	YES	
P0504340	GX_304-01	450	A	YES	
P0504341	GRO_J1744-28	450	A	YES	
Title	引力波高能电磁对应体及特殊伽马暴的观测		PI	Dr. ShaolinXiong	
ABSTRACT	地面引力波探测器将于 2022 年底开始 O4 观测，利用慧眼卫星监测和搜寻跟引力波事件成协的高能电磁对应体具有重要意义。由于引力波事件的距离相对较近（< ~200 Mpc），当视线角度靠近喷流中心时，伽马暴及其 X 射线余辉可能被慧眼观测到。此外，对于一些特殊的伽马暴，包括有磁星参与的双致密星并合、磁星作为中心引擎、跟邻近星系成协或其它指标显示距离较近、超长暴等，慧眼卫星可发挥连续监测的优势，在宽能区捕捉主暴之后的后续爆发活动，研究爆发的能谱和时变特征。此外，使用光学望远镜进行联合观测，监测可能产生的超新星或千新星。				

Special requirement	Coordinated observations.				
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0504342	GW or special GRBs	800	A	YES	
Title	Spectral and Timing Properties of Black Hole X-ray Binary GRS 1915+105 in High/Soft State		PI	Dr. ChangLiu	
ABSTRACT	The accretion disk radiation is mainly in the X-ray band in the black hole X-ray binary system. According to the spectral and timing properties of X-rays, black hole X-ray binaries are divided into five states. At very high states, there is a hot and optically thick corona on the accretion disk (ie, Disk+Corona model). High-frequency quasi-periodic oscillations (HFQPOs) are generally considered to be in very high states. However, the physical origin of HFQPOs remains unclear. Sreehair et al. (2020) found the existence of HFQPOs on the high\soft state of the black hole X-ray binary GRS 1915+105, which is inconsistent with previous physical interpretations. The current mainstream view cannot explain this phenomenon. The study of spectral and timing properties of high/soft states provides a possibility for the study of the physical origin of HFQPOs. However, the observational data of the high/soft states of GRS				

	1915+105 are few, which makes it difficult to study the physical origin of HFQPOs. As a results, the Insight-HXMT has a wide energy band and a large coverage area, which can solve these problems very well. This proposal uses the GRS 1915+105 data observed by the Insight-HXMT to analyze the spectral and timing of the high/soft state of GRS 1915+105 to explore the physical origin of HFQPOs.				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0505112	GRS_1915+105	10	B	NO	
Title	z 源硬 X 射线辐射慧眼卫星卫星观测研究		PI	Pro. GuoqiangDing	

ABSTRACT	长期以来，X 射线天文卫星观测表明两类 X 射线双星硬 X 射线 (> 辐射 存在很大差别：黑洞 X 射线双星的硬 X 射线辐射容易观测到，而中子星 X 射线双星的硬 X 射线辐射不常见，可是偶尔也能观测到。一般认为，黑洞 X 射线双星中存在高温冕，吸积盘 辐射的软 X 射线光子被高温冕中的高能电子康普顿化产生硬 X 射线辐射。 迄今没有观测证据表明中子星 X 射线双星中存在高温冕，中子星 X 射线双星的硬 X 射线辐射起源长期以来也没有达成统一的认识。 慧眼卫星高能探测器探测面积 高达五千平方厘米， 其观测数据为研究 X 射线双星硬 X 射线辐射 规律 提供 了 机遇； 同时，慧眼卫星 宽能区能谱也为研究 X 射线双星的硬 X 射线 辐射 起源提供了可能。 本提案申请慧眼卫星对高光度中子星 X 射线双星 Z 源的补充观测， 从而系统研究 Z 源硬 X 射线辐射规律及辐射起源。				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0505343	4U_1642-45	540	B	YES	
P0505344	GX_349+02	500	A	YES	

P0505345	4U_1758-25	320	C	YES	

(3) Calibration proposals

Title	慧眼-HXMT 在轨标定观测提案				
ABSTRACT	由于部分载荷的工作状态进行了调整，而且性能存在演化，因此慧眼的能量响应、有效面积、准直器响应等还需要持续的进行在轨标定。申请 2020 年度标定观测，具体为：对 Crab 定点观测 9 次，Cas A 定点观测 8 次， Tycho 定点观测 1 次，总观测时间 27 天。对 Crab 扫描观测 12 次，扫描区域半径 7 度，扫描间隔 0.1 度，扫描速度 0.06 度/s，扫描时间为 6 天，其中有效曝光时间为 3 天。				
Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note

P0502130	SAS_053431+220054_7.00	-	A	NO	
P0502131	Cas_A	691	A	NO	
P0502132	Crab	389	A	NO	
Title	慧眼-HXMT 的空天区定点观测				
ABSTRACT	对于空天区的观测，是慧眼-HXMT 最重要的常规观测之一。其数据，将用于慧眼卫星的本底，标定，以及弥散辐射的研究。我们根据国际上其他卫星的观测，找出了 16 个空白天区，其特点是流量，谱形稳定。在本底构建方面，空天区的观测数据可以为高中低能三个载荷提供实测数据，开展本底的相关研究，以构建本底模型。在仪器标定方面，载荷自身的本底谱线，在空天区观测中具有最高的显著性，可用于能量-能道关系的监测和标定。在高能宇宙弥散背景方面，地球掩蚀前后的空天区观测数据的差异，是由弥散 X 射线导致。因此，空天区的观测对于高能宇宙弥散辐射同样意义重大。 申请 2022-2023 观测季（1 年）的空天区观测 130 次，总曝光时间 2.2 Ms。				

Special requirement					
Obs No.	Target	Exp. Duration	Grade	ToO?	Note
P0501008	BLANK_SKY21	65	A	NO	
P0501009	BLANK_SKY20	65	A	NO	
P0501010	BLANK_SKY19	65	A	NO	
P0501011	BLANK_SKY16	65	A	NO	
P0501012	BLANK_SKY15	65	A	NO	
P0501013	BLANK_SKY14	65	A	NO	

P0501014	BLANK_SKY12	65	A	NO	
P0501015	BLANK_SKY11	65	A	NO	
P0501016	BLANK_SKY10	65	A	NO	
P0501017	BLANK_SKY8	65	A	NO	
P0501018	BLANK_SKY6	65	A	NO	
P0501019	BLANK_SKY5	65	A	NO	
P0501020	BLANK_SKY4	65	A	NO	
P0501021	BLANK_SKY3	65	A	NO	

P0501022	BLANK_SKY2	65	A	NO	
P0501023	BLANK_SKY1	65	A	NO	