Galactic transients and tidal disruption events - the local transient sky

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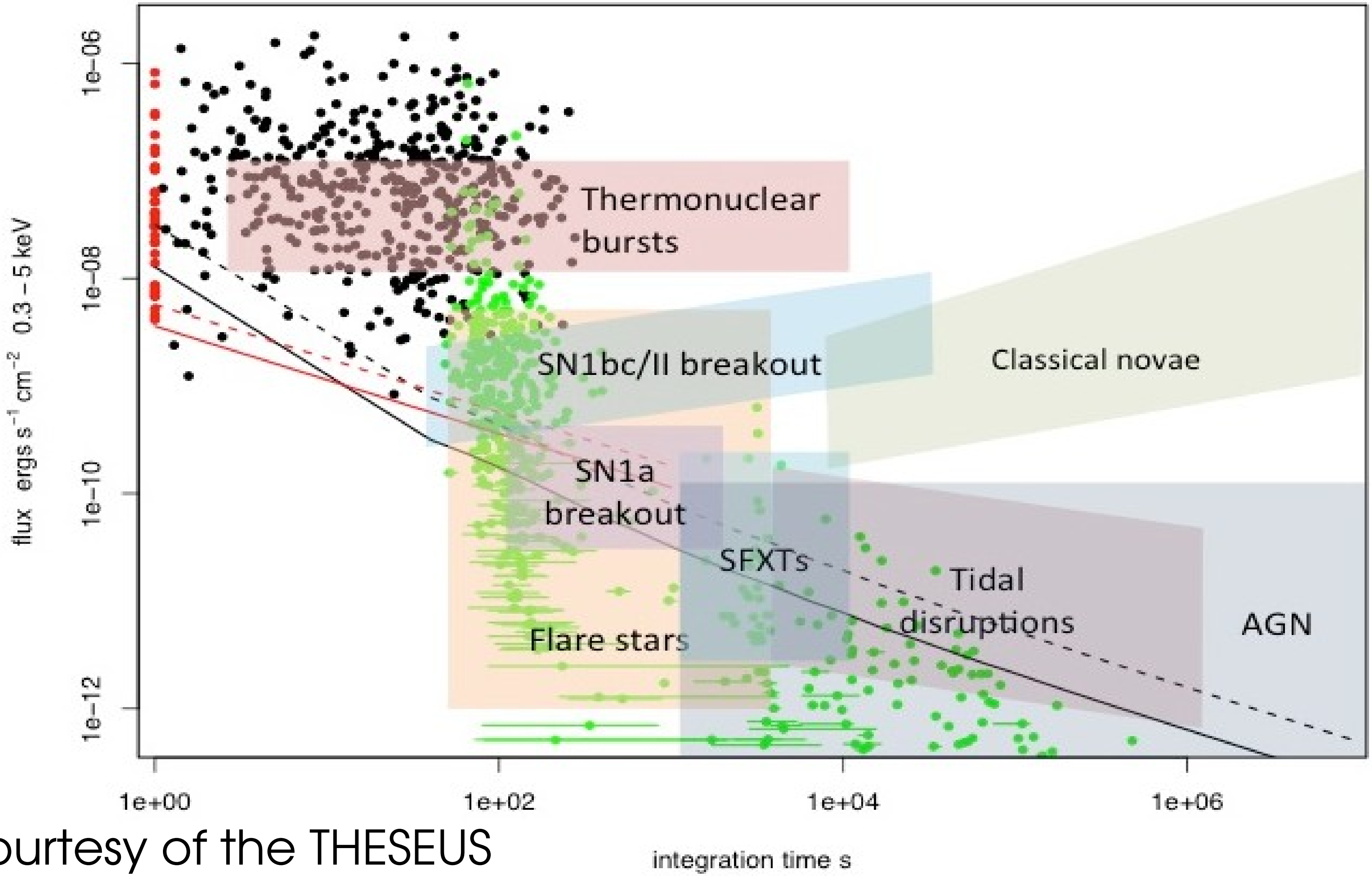
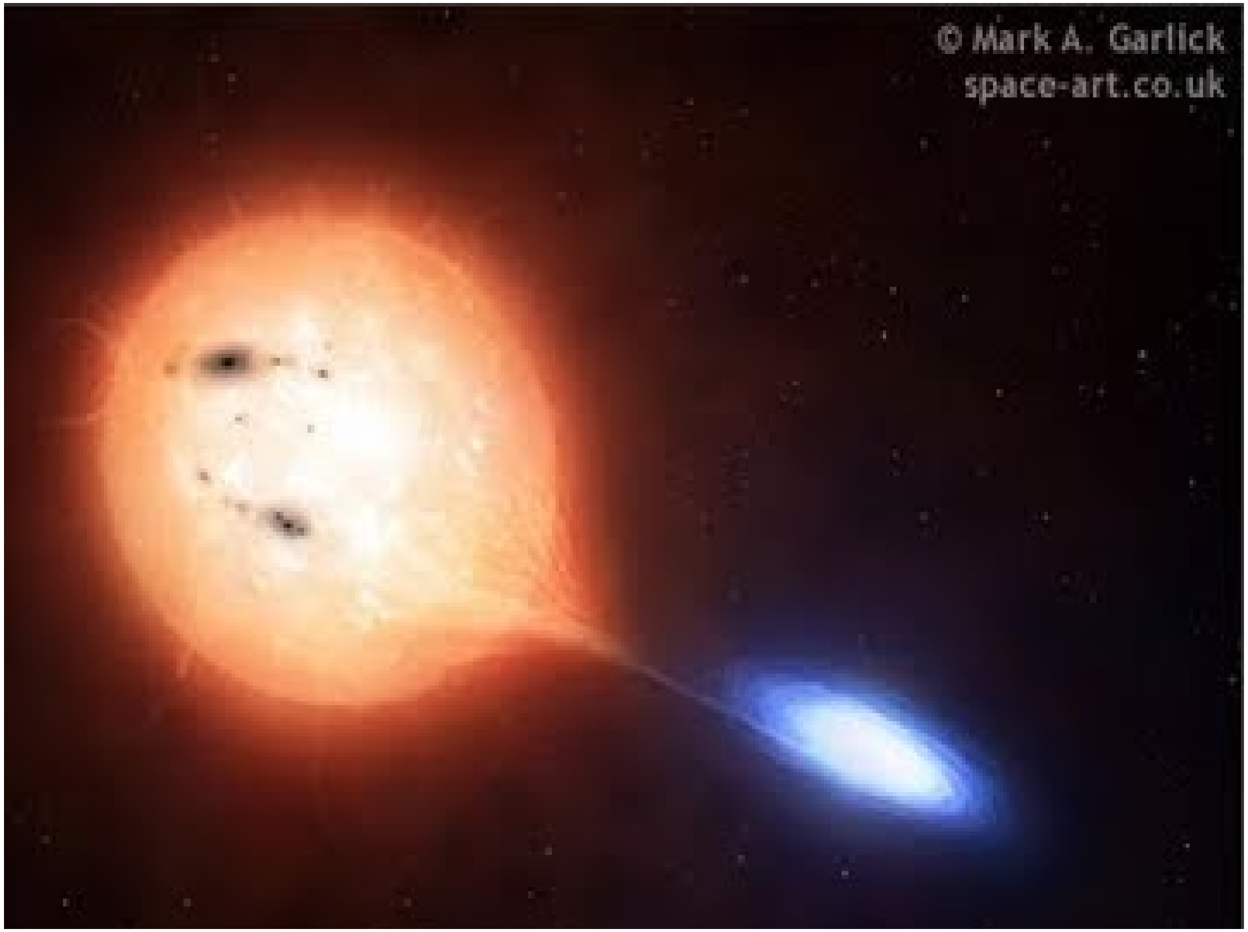
The local transient sky



Courtesy of the THESEUS white paper, 2017

Novae



Demographics of white dwarfs

Study accretion-ejection & disc instability model

Mass-magnetism link in white dwarfs ?

Which CVs become novae ?

Understanding type 1a supernovae

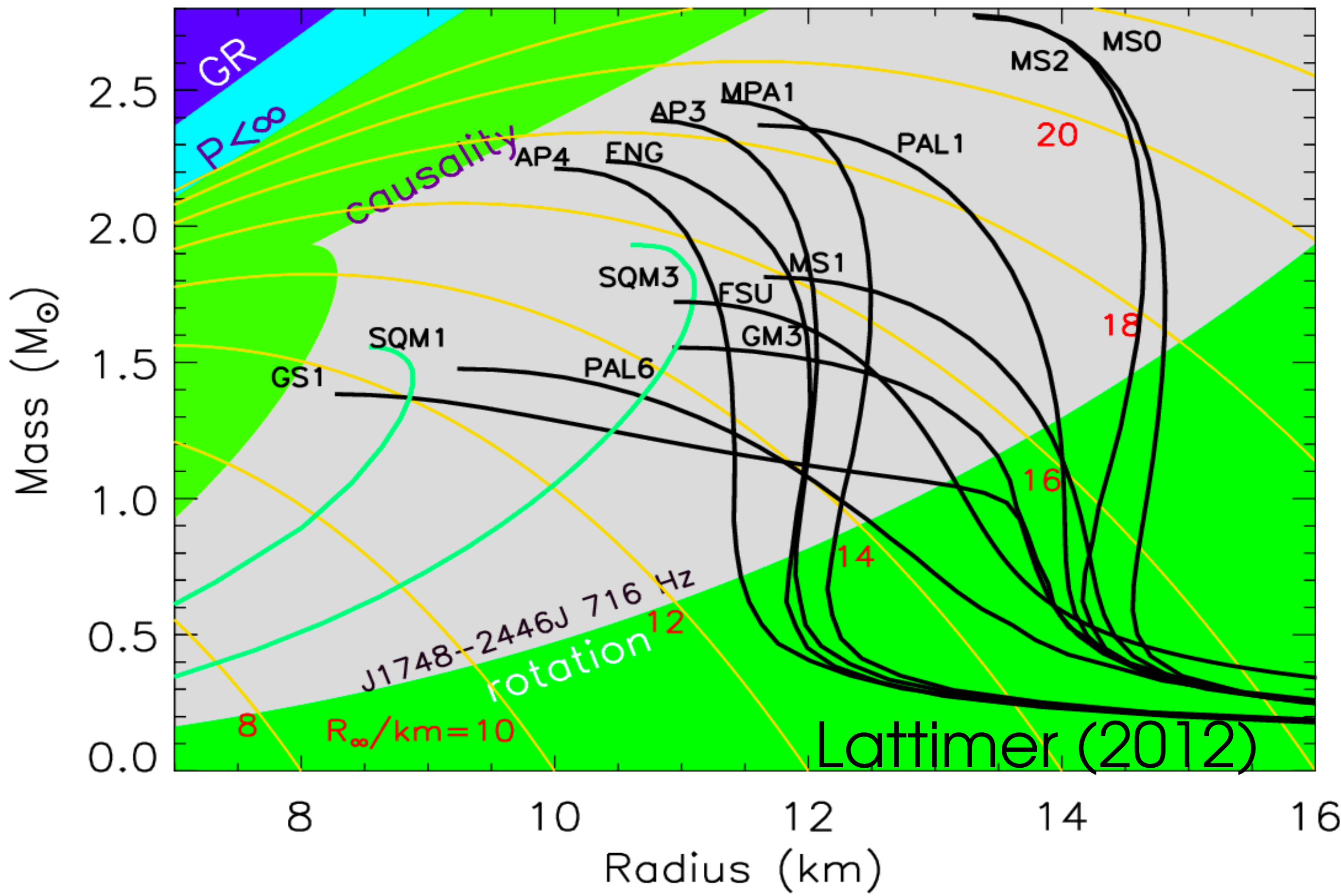
Thermal nuclear runaways result in novae

Study dwarf novae and novae in X-rays, IR and gamma

Neutron stars

What is the nature of matter in neutron stars ?

- mass & radius constraints through :
  - type 1 (thermo-nuclear) bursts
  - modelling burst oscillations



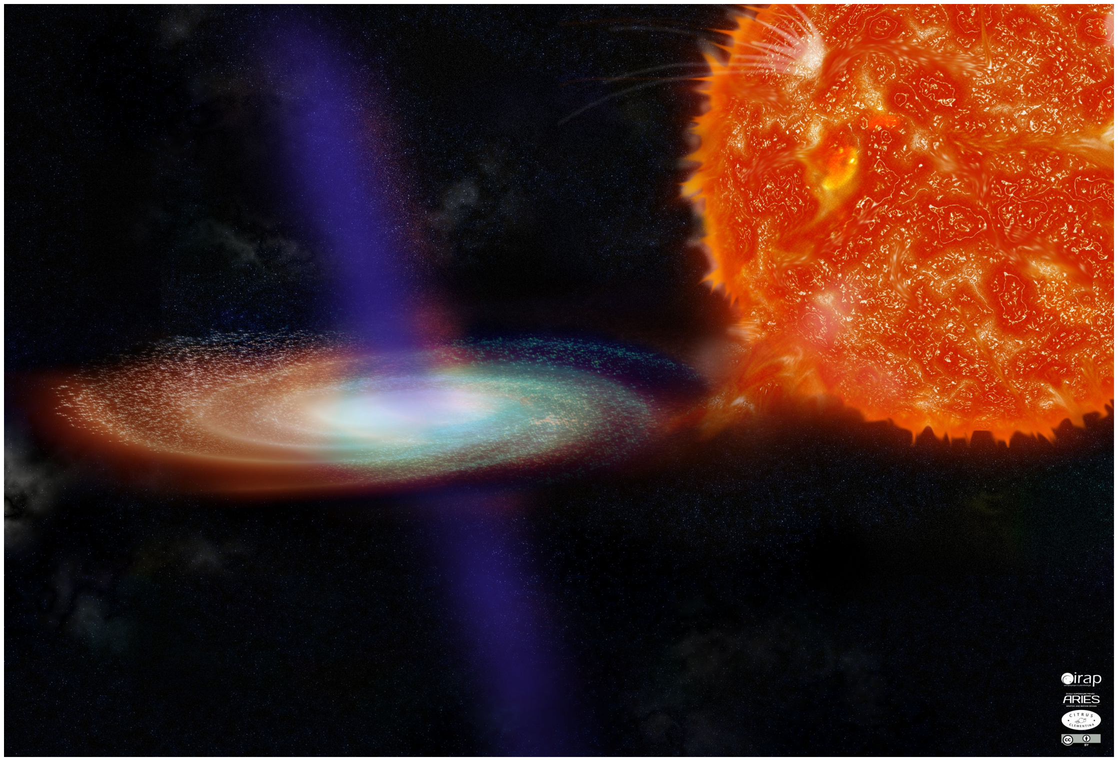
Demographics of neutron stars and magnetars

Understand the magnetar origin and nature of magnetar field

35 type I bursts & 40 magnetar bursts per day (THESEUS white paper)

X-ray binaries

1000 supergiant fast X-ray transient outbursts expected per year



Derive temperature and optical depth of the accretion column

Localise X-ray binaries :

Study accretion-ejection

(X-ray/γ-ray & IR)

Understand stellar evolution and demographics

Study Ultra Luminous X-ray sources and understand their link with X-ray binaries and gravitational wave events

Tidal disruption events

Detecting tidal disruption events (TDEs) allows us to find massive black holes that are normally too faint to detect

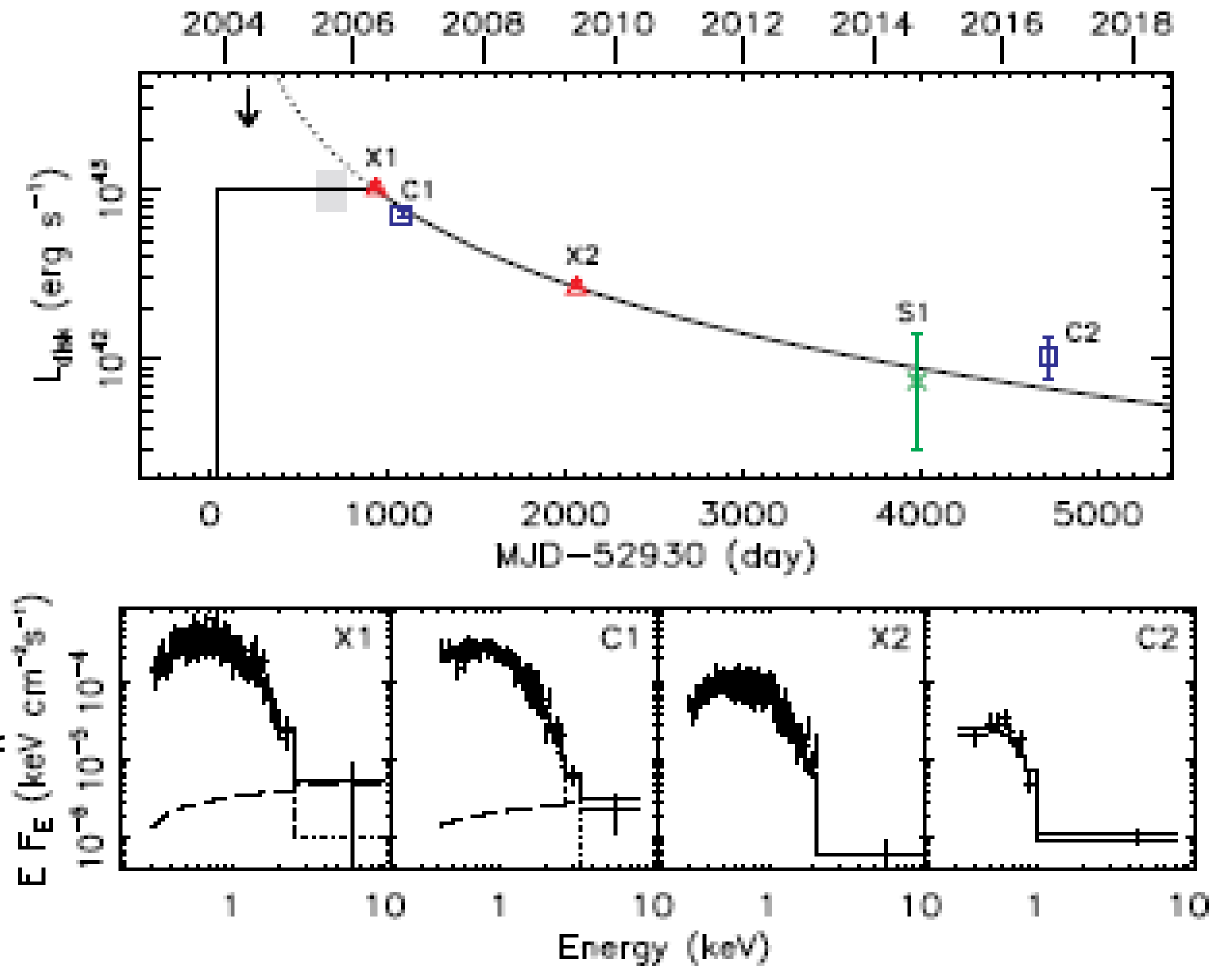
Tidal radius inside black hole (BH) event horizon for $M > 10^8 M_\odot$

Observe TDE from lower mass BHs + accretion (super-)Eddington

If event close and bright it may be possible to detect an iron line and put limits on the mass and the spin (e.g. Karas et al. 2014)

50 TDEs expected per year

TDEs and intermediate mass black holes



Demographics and origin of IMBH

Nature of hard TDEs/soft TDEs/optical TDEs

Study the nature of super-Eddington accretion

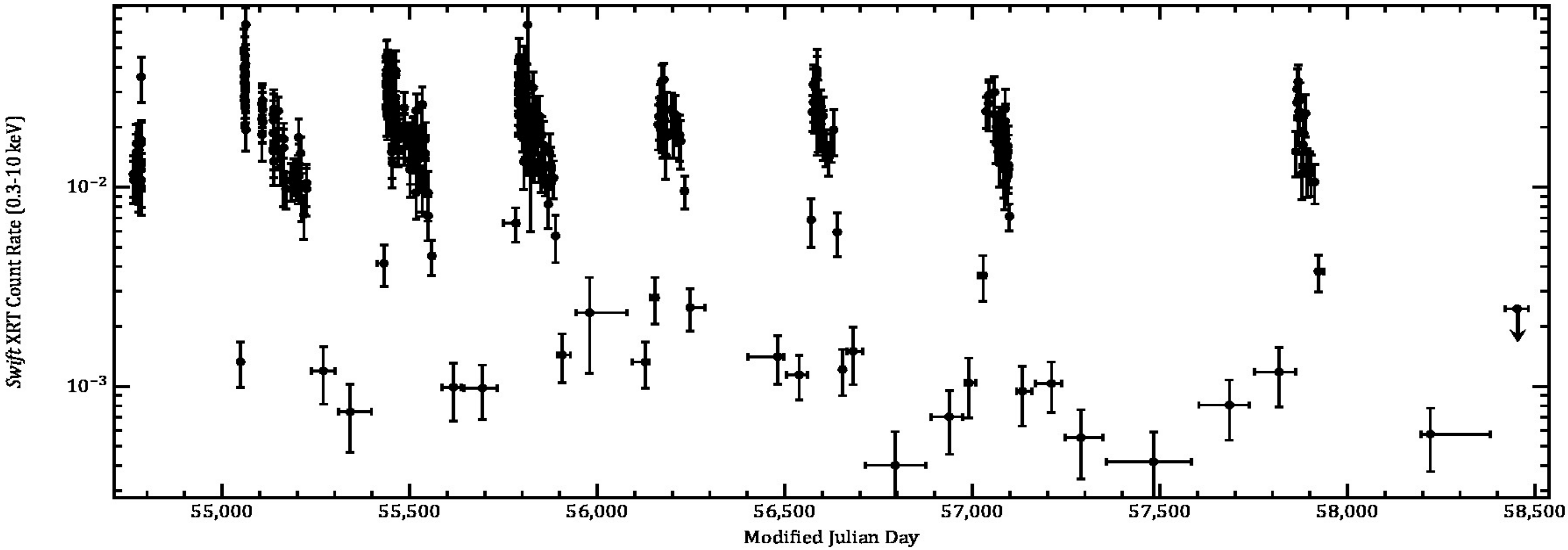
Understand the formation of supermassive black hole

Locate grav. wave sources (IMBH + white dwarf, etc) using electromagnetic emission

Other transients

FRBS – detect at other wavelengths
Determine nature & demographics
Study phenomena close to compact object

HLX-1-like sources ?



Serendipitous science ?

Summary

THESEUS should be able to make important contributions to :

Accretion and ejection physics

Understanding type 1a supernovae

Demographics of compact objects and thus understanding stellar evolution

The nature of neutron star matter

The origin of magnetars and their strong magnetic fields

The formation and evolution of supermassive black holes

Discovery of new serendipitously detected (classes of) objects

Follow-up transients detected at other facilities