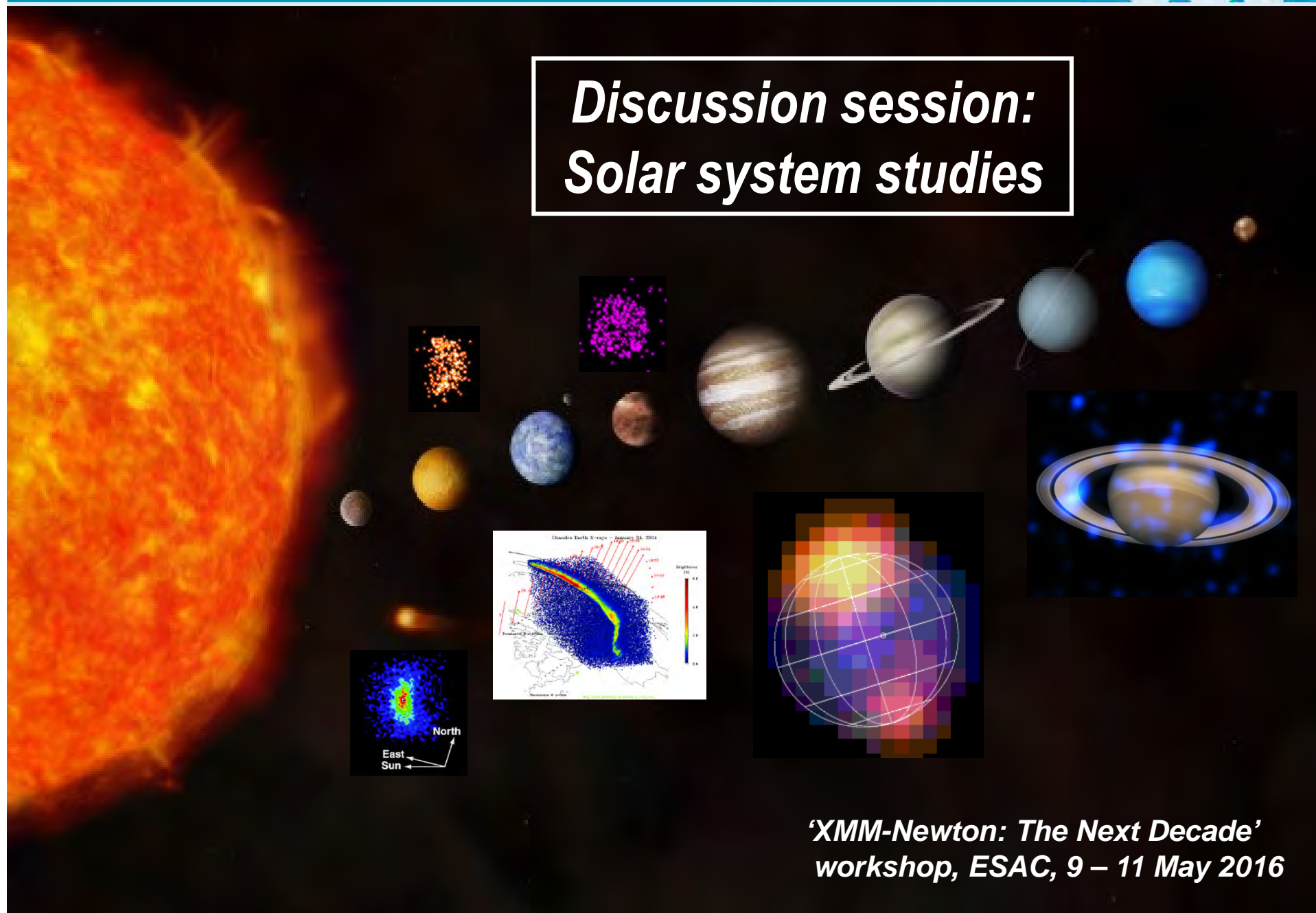


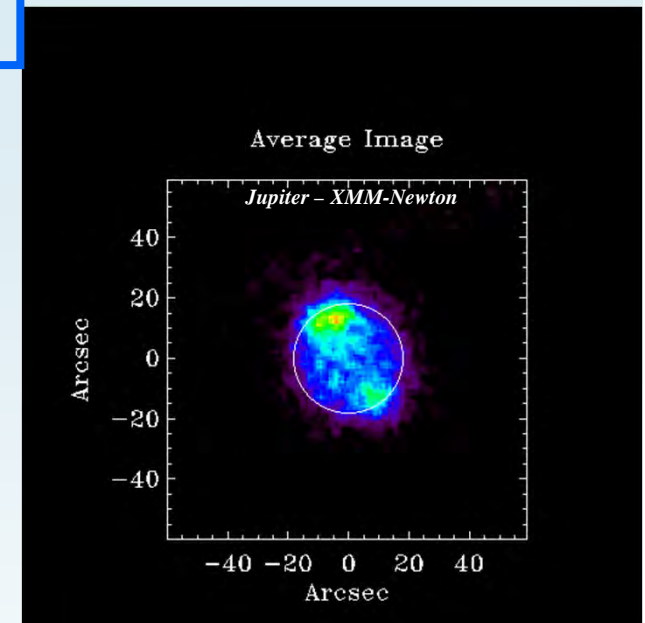
Discussion session: Solar system studies



'XMM-Newton: The Next Decade'
workshop, ESAC, 9 – 11 May 2016

Looking ahead with *XMM-Newton* ...

- *XMM-Newton* and *Chandra* have demonstrated the **potential of planetary X-ray astronomy**
- *XMM-Newton* observations **during enhanced solar activity & simultaneous with other facilities** (*Chandra*, *HST*, *Gemini*, etc.) provide additional unparalleled scientific return
- Must exploit synergy with **in-situ missions** (like *JUNO*, 2016-17, and *SMILE*, 2021 onwards)
- Major objective is to determine **how solar wind interacts** with planetary magnetospheres (e.g. **Jupiter**) and exospheres (**Mars**, & **Earth** too!) and **comets**
- *XMM-Newton* **by far the best mission** for solar system X-ray studies:
EPIC large FOV + **unique combination** of high sensitivity (especially at low energy) with moderate (EPIC) and superb (RGS) energy resolution, and OM (UV) particularly important for comets



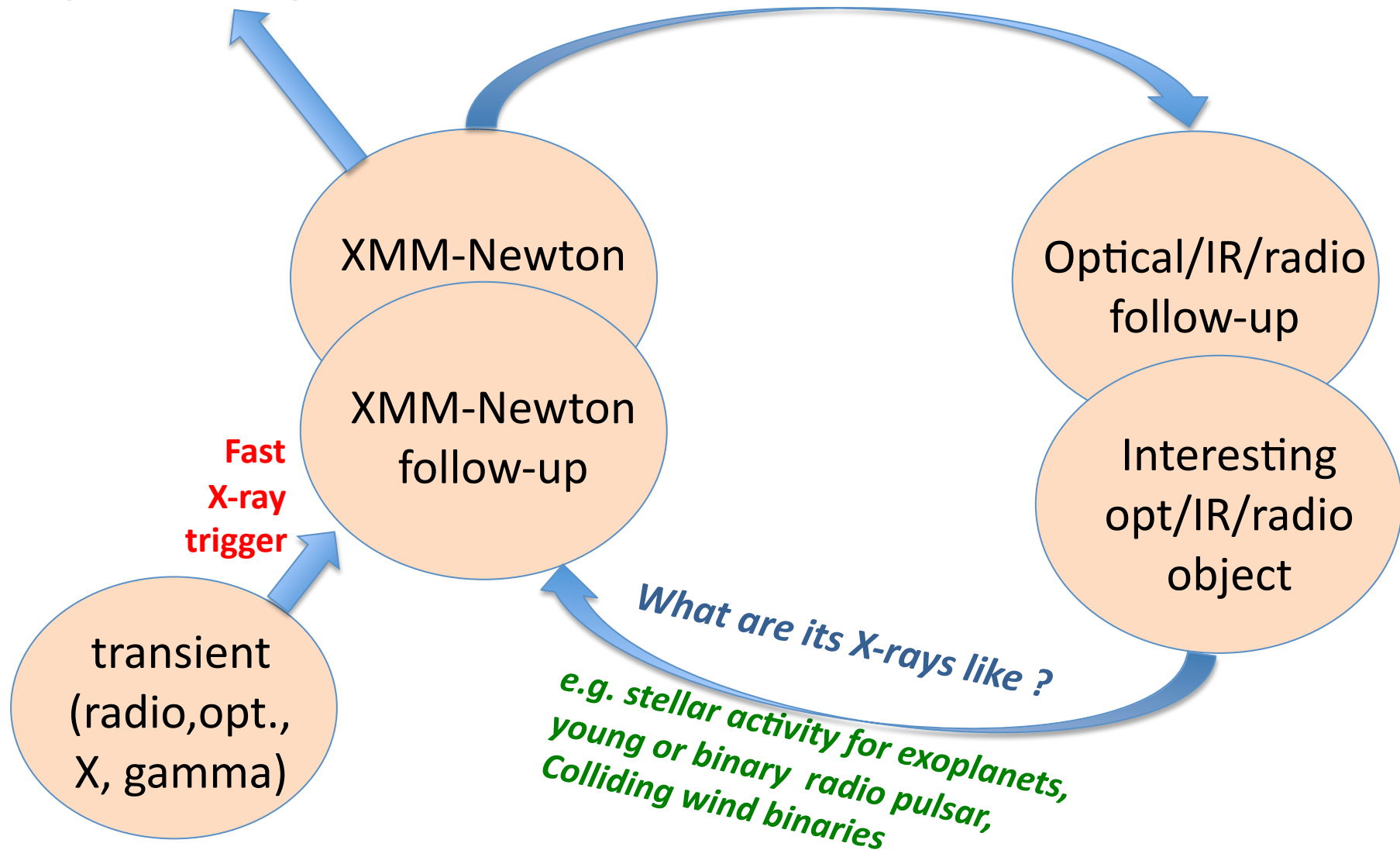
XMM-Newton in the multi- λ context

Great new physics

*e.g. on outer stellar atmosphere,
magnetar cooling curves*

What is this X-ray source?

e.g. star vs AGN, stellar SpT, magnetar, XRB



**Fast
X-ray
trigger**

transient
(radio, opt.,
X, gamma)

XMM-Newton

XMM-Newton
follow-up

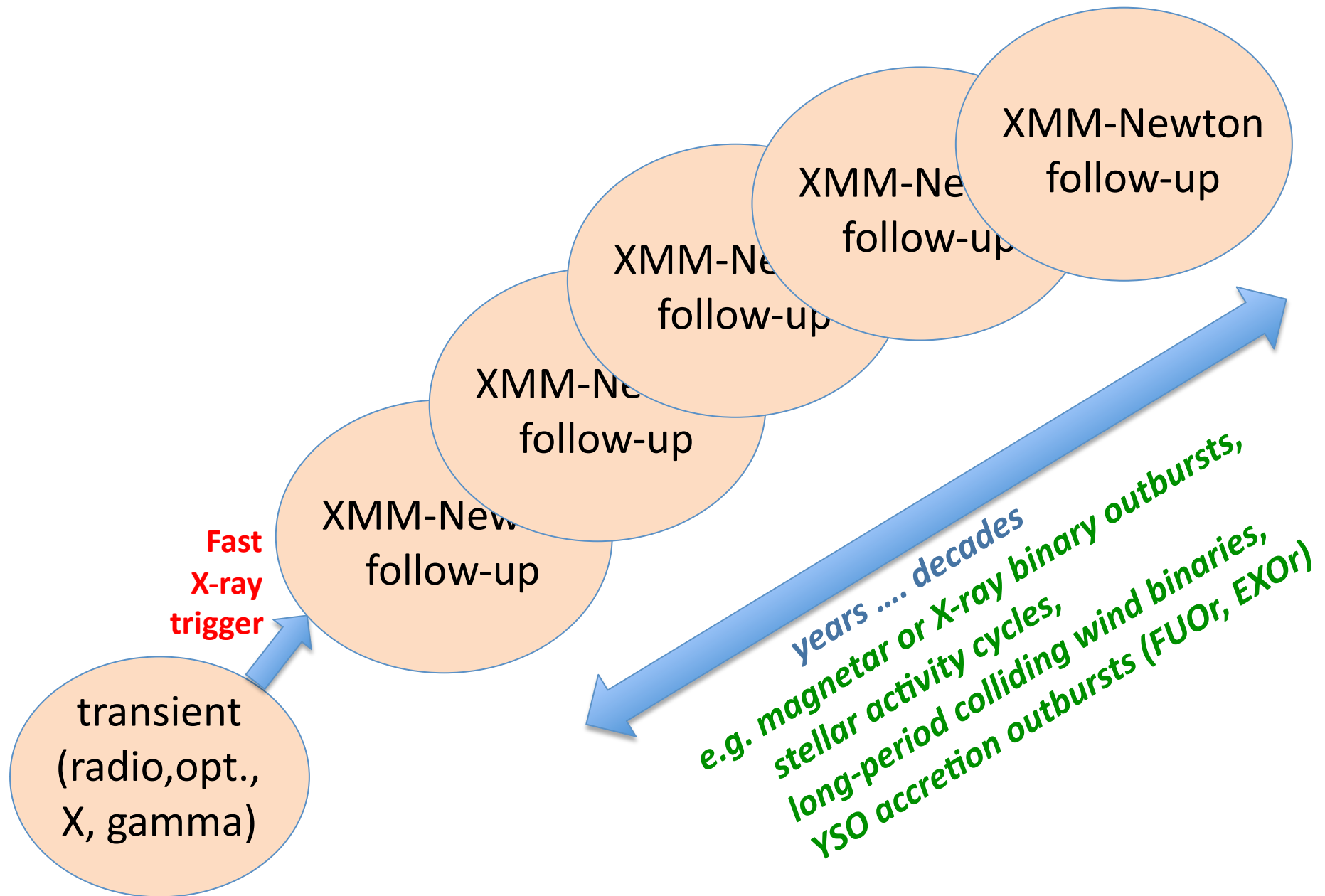
Optical/IR/radio
follow-up

Interesting
opt/IR/radio
object

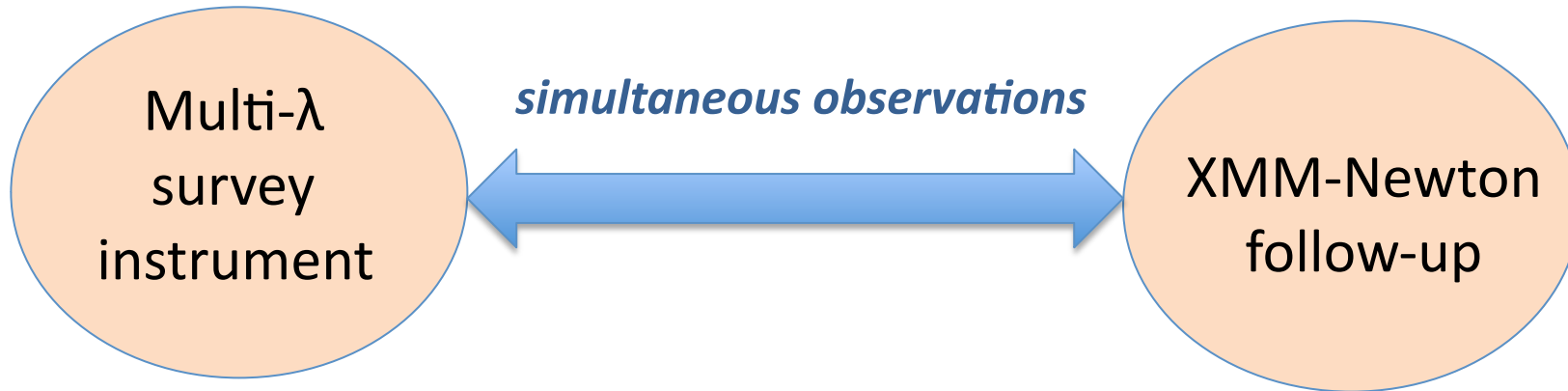
What are its X-rays like ?

*e.g. stellar activity for exoplanets,
young or binary radio pulsar,
Colliding wind binaries*

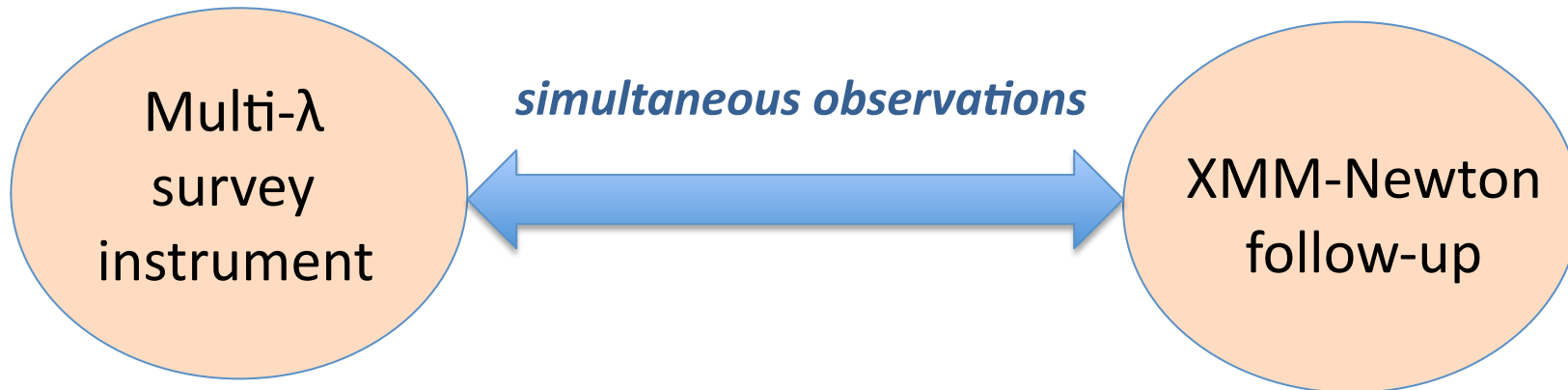
XMM-Newton in the multi- λ context



XMM-Newton in the multi- λ context



XMM-Newton in the multi- λ context



e.g.

- *stellar flares + rotation with photometric monitoring from space (K2, TESS, PLATO)*
- *stellar corona vs aurora emission with JVLA, SKA-precursors*
- *new millisecond pulsars from radio surveys (Parkes, GBT, LOFAR, ASKAP, MeerKAT)*
- *new transients in the X-ray all-sky monitors (Swift, Fermi-GBM, MAXI, eROSITA)*
- *new γ Cas analogs or colliding wind binary candidates (eROSITA)*

XMM-Newton in the Next Decade

*Which use of XMM-Newton
will be most important in the Next Decade?*

(A) “stand-alone” science (no need of other facilities)

(B) simultaneous observations (opt/IR/radio + XMM-Newton)

(C) “follow-up” science (opt/IR/radio → XMM-Newton and vice versa)

(D) fast triggered observations of Galactic and extra-galactic transients

Need for longer and longer (nearly) uninterrupted observations

e.g.

- *YSO accretion events triggered by flares (1-2 days)*
- *rotational modulation in winds of massive stars (few days to a week)*
- *rotational/orbital accretion variability (of flux and emission lines): few days*



*Is a change in policy needed
to facilitate new science
only accessible with long data sets?*

XMM-Newton strategy for “small” samples

