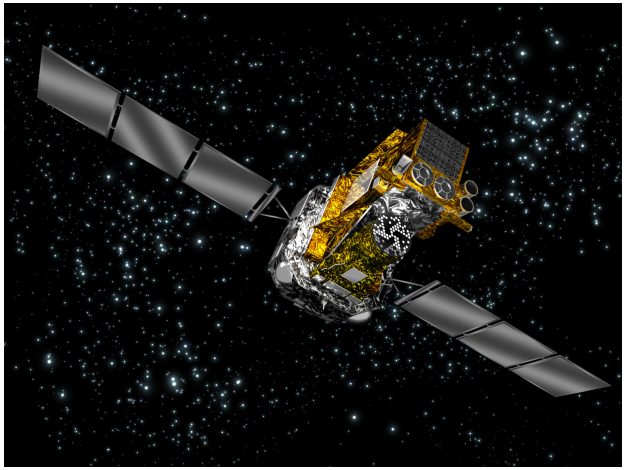
INTEGRAL
Project Scientist

Erik Kuulkers

(ESA/ESTEC)



[INTEGRAL] Community Interfaces

- IUG Invitees: Richard Southworth (ESOC), Brian McBreen (UCD; AO-19 TAC Chair), Jerôme Chenevez (JEM-X, DTU)

[INTEGRAL] 2023+?

- Primary purpose of this meeting: find attractive & innovative scenario for operations in the 2023-2025 period (and beyond?) + statement how many more years are needed
- Show how unique INTEGRAL is, and how much scientific community would lose by its absence in current/future fleet of missions (*does a graph exist?*)

What would be left unfinished, unresolved, inconclusive, if INTEGRAL operations were *not* extended beyond 2022?

- The community needs to show that they are indeed **passionate** for the science INTEGRAL will deliver (tomorrow we'll discuss community response)!
- *Very* limited time: < half a year; strategy must be ready by Spring 2021
- June 2021: ESA executive consult with SPC on future of INTEGRAL beyond 2022

[INTEGRAL] 2023+?

Some ideas to stimulate further thoughts and discussion:

- Direct communication with and lobbying of national delegates: How can this be made more effective?
- How much does INTEGRAL really depend on getting new data? How much can be done with the archive?
- Currently extension case already important emphasis on ToO observations, but community has to demonstrate and motivate need for, importance of, and successes based on new data
- Need also a solid non-ToO program; e.g., Legacy program
- Where can INTEGRAL take higher risks to enable newer more exciting science? Solar system objects or phenomena? Example: Earth aurorae together with EOP missions?

Summary of aims for 2021-2022 & 2023-2025

Slide from extension presentation to AWG

➢ Strong focus on:

ToO capabilities of INTEGRAL in broadest sense:

- The "Multi-messenger astronomies": GW events, high-energy neutrino events & FRBs
  ☛ INTEGRAL prompt & ToO follow-up observations
- 3 Msec reservation of ToO time per AO for other transients: e.g., Novae, Supernovae, outbursts of Black Holes in X-ray binaries & AGNs (Micro-quasars, Blazars and Quasars seen out to z=3.6)

+ Legacy programs in areas for which INTEGRAL was designed:

- (Galactic) *nucleosynthesis*; synergy with other observatories, like NuSTAR, Swift, XMM-Newton
- Continued transient hunting in the Galactic Center region and Galactic plane, its e+/e- annihilation emission and precise study of its asymmetric structure
- Study of *polarization* at gamma-ray energies (100 – 3000 keV) - of relativistic jets of black holes in XRBs and AGNs, and sources like Crab, GRBs, etc. ☛ synergy with future mission IXPE

+ Possible additional science:

- Solar system observations: Earth aurora (TBC with *Swarm*, 2nd half of 2021), Jupiter & Moon (community interest for 2021)

[INTEGRAL] 2023+?

Some ideas to stimulate further thoughts and discussion:

- Abandon Announcement of Opportunities? [not favoured by few people]
  - This saves time and (some) money
  - IUG with PS could define the observing Programme
  - Build programme for maximum coordination with XMM-Newton and NuSTAR on best targets for INTEGRAL:
    - E.g.: React to ToOs - follow XMM-Newton/NuSTAR if no specific plan (within visibility) - standard targets to fill gap
- Involve the wider high-energy community: How can this be done?
  - Modern newsletter, social media, more outreach, conferences with VIPs to attract more participants?