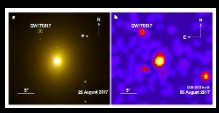


Athena Multi-messenger Synergy

WP

Luigi Piro
(INAF/IAPS)



Tasked by ASST#17 June 2018: Athena-Multimessenger Synergy Exercise (coordinated by LP)



General Networking and Support to the Community

AHEAD (Integrated Activities for the High Energy Astrophysics Domain)

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The Athena Multi-messenger Workshop

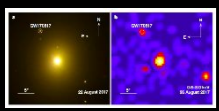
The Athena Multi-messenger and High Energy Astrophysics Synergy Workshop (AMHEAS)

November 27 - 29, 2018, Alicante, Spain

Photo credit: Diario Información

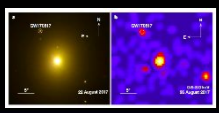
List of participants

- | | |
|------------------------------------|----------------------------------------------------|
| D. Barret | Athena X-IFU PI |
| D. Burrows | Athena expert for transients (A/Theseus synergy) |
| F. Carrera | Athena Community Office: support |
| M. Colpi | LISA representative |
| D. Dornic | KM3NET representative |
| A. Fabian | Athena representative for A/LISA synergy |
| M. Guainazzi | Athena Study Scientist |
| P. McNamara | LISA Study Scientist |
| P. O'Brien | Athena & Theseus representative |
| J. Osborne | Theseus expert for A/Theseus synergy |
| S. Martinez | Athena Community Office: support |
| P. Padovani | Expert for ν 's synergy |
| L. Piro | Chair |
| N. Tanvir | LISA representative |
| J.M. Torrejon | LOC organizer (AHEAD) |
| E. Troja | Athena representative for ground-based GW synergy |
| J. Vink | Athena representative for ν 's and CTA synergy |
| D. Nichols | LIGO/VIRGO |
| M. Ahlers | IceCube |
| A. Coleiro | KM3NET |
| A. Sesana | SMBBH |
| E. Bozzo | Galactic sources |
| Not coming but involved in the WP: | |
| L. Amati | Theseus representative |
| A. Rau | Athena expert for transients (A/Theseus synergy) |
| E. Rossi | LISA expert |
| R. Mignani | Athena expert for ν 's and CTA synergy |
| P. Jonker | Athena representative for ground-based GW synergy |



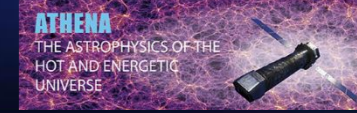
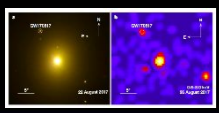
Context

- The team is tasked to identify and develop potential scientific synergies between the Athena X-ray observatory mission (ESA) and Gravitational Waves, neutrinos, high energy and Gamma Ray Burst (GW/ ν 's/HE/GRB) facilities that will be operational contemporary to Athena.
- The goal is to produce a **White Paper** that should address the scientific topics where the synergetic use of Athena and the key multimessenger facilities operating at the end of this decade will result in a scientific added value



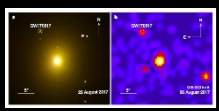
Approach

- Each facility (incl Athena): contact person + experts
- Each contact person is in charge of co-leading (with the Athena- equivalent) the writing of the WP with the contribution of relevant experts



Status

- WP currently includes all key scientific themes, topics and landscape discussion, including some high level link with (Athena) core and observatory science plus new exciting topics.
- Currently already 50 page; About 10-15 pages per section, (max pages ~70)
- WP release: targeting Q3 2020 (TBD vis a vis with the response matrices release)



Outlook

- Strengthen the discussion of the MM topics with the present science program of the related facilities.
 - For each topic discuss if that already part of the present science goals (in particular Athena) and the added value of this MM synergy or if it new one
- Elaborate the observational strategy needed to implement each synergy science topic
 - e.g. how many targets, integration times, request of TOO, any non-standard operational requirement.
 - simulations when needed to assess quantitatively the observation plan and provide key figures
- Need key figures for each section (2-3) to support specific topics (in addition to those illustrating the facilities)
- WP can be used to update the core science = > red book preparation
 - This is a good timing so Athena and the other facilities projects can decide whether to include some of the specific synergy topics in the mission profile (science, ops)