Summer 2022

IAF SPACE ASTRONOMY TECHNICAL COMMITTEE (SATC)

1. Introduction

Ground and Space Astronomy synergy has recently permitted a phase of remarkable discovery and growth. Public recognition is the several Nobel physics prizes gained in (observational) cosmology, exoplanets, gravitational waves, X-ray astronomy, and astrophysical neutrinos. Although the field of astrophysics is vast, the IAF Space Astronomy Technical Committee (SATC) concentrates its work in the area of space astronomy and in particular, serves as a forum for the exchange of information and interaction between the scientific community, space industry, and space agencies involved in the preparation and the future development of new astronomy missions. Therefore, the SATC action covers the very early phases of mission concepts before these are proposed to the Agencies for assessment. As such, the SATC role is largely complementary and comes ahead of the possible future Agency programmes. As such, SATC fulfils a role to enable or improve the emergence of new science mission concepts.

2. Latest Developments

1.New insight on IGR J18249-3243 /Gamma-radio galaxy

Radio surveys realized with the latest generation radio telescopes, like VLA Sky Survey (VLASS) and Rapid ASKAP Continuum Survey (RACS), are opening new opportunities for the study of the **gamma-ray sky**. Radio galaxies in particular, famous for their spectacular relativistic jets visible in the radio band, and extending well beyond their host galaxy, are among the less represented **extragalactic sources** in the high energy catalogue by Fermi/LAT. Indeed, both high sensitivity and resolution are needed to spot them. Thanks to the VLASS and RACS data it has been possible to reveal how an increasing number of extragalactic sources seen by **Fermi/ LAT** are associated with radio galaxies. Recently, the INTEGRAL scientists in Rome have studied in detail the gamma-ray source IGR J18249-3243 discovered almost 20 years ago by INTEGRAL. This source, belonging to the Fanaroff-Riley II class, shows intense radio-emitting lobes at the jets far end, reaching out tens of kpc from the central nucleus. The study of its broadband emission in radio, X, hard-X and gamma bands revealed peculiar properties: at the Fermi/ LAT energies (GeV), the flux is ten times stronger than expected. By comparing these https://www.asi.it/en/2022/05/the-emerging-population-of-radio-galaxies-in-the-gamma-ray-sky-of-integral-and-fermi/

3. Breakthroughs

1. Detected, the black hole in the Galaxy Centre

On May 12 with simultaneous press conferences, astronomers unveiled the first image of the supermassive black hole at the centre of our Galaxy. This result provides evidence that the object is coincident with SgrA*, the non-thermal radio source in the Galaxy centre, is indeed a black hole and yields valuable clues about the physical processes in place there. Similar objects are thought to reside at the centre of most galaxies. The image was produced by a global research team called the Event Horizon Telescope (EHT) Collaboration, using interferometry observations from a worldwide network of radio telescopes. https://www.eso.org/public/news/eso2208-eht-mw/

2. IXPE Launch

On Thursday, Dec. 9, 2021, a SpaceX Falcon 9 rocket launched with NASA's Imaging X-ray Polarimetry Explorer (IXPE) spacecraft onboard from the Launch Complex at NASA's Kennedy Space Center in Florida. The IXPE spacecraft is the first satellite dedicated to measuring the polarization of X-rays from a variety of cosmic sources, such as black holes and neutron stars.

The launch occurred at 1 a.m. EST. https://www.nasa.gov/press-release/nasa-launches-new-mission-to-explore-universe-s-most-dramatic-objects

4. Action plan for the year

The main SATC activity for the current year focused on:

1. Long-term analysis of the technical, scientific and programmatic areas of space astronomy. Serve as a *forum for the exchange of information and interaction between the scientific community, space industry and agencies* involved in the preparation and future development of new astronomy missions. Particular emphasis is on technological breakthroughs for future space applications (e.g. space cryogenics systems, cube-sat constellations, space-ground synergy).
2. Organizing the A7 session for the IAC 2022 to provide a wide range of topics on future space plans by Agencies as well as highlighting current and future technologies relevant to the Space Astronomy community in dedicated sessions at the IAC.
3. Planning for the A7 symposium at IAC 2023 for the discussion and publication of ideas and relevant results and issues to the impact and needs of future astronomical missions.
4. In addition to the IAF/IAC meetings, the committee will also organize several intermediate virtual meetings for members during the year.