The heritage of INTEGRAL for multi-messenger astronomy

Samuele Ronchini*†[1]

[1]Gran Sasso Science Institute – Italy

Abstract

For over two decades, INTEGRAL has provided a unique and continuous monitoring of the gamma-ray sky, and its role has proven foundational for multi-messenger astronomy. In this presentation, I will review the mission's key contributions to gravitational-wave (GW) follow-up, the main results obtained across the LIGO-Virgo-KAGRA observing runs, and the lessons that will guide the role of high-energy satellites in the coming Einstein Telescope (ET) era. I will discuss the ground breaking impact of the joint detection of GRB 170817A with GW170817, highlighting the substantial contribution of the SPI-ACS instrument. Looking ahead, I will discuss how high-energy satellites will be indispensable in the ET era: with ET expected to detect orders of magnitude more compact-binary mergers, the presence of wide-field X-ray and gamma-ray telescopes will be essential to identify and characterize the electromagnetic counterparts among a vastly larger and more distant population of events. I will conclude by discussing how the lessons learned with INTEGRAL will directly inform the design, sky coverage, and response strategies of the high-energy facilities that will need to operate alongside next generation of GW detectors, underlining INTEGRAL's legacy as the landmark for future developments for gamma-ray multi-messenger astronomy.

*Speaker

†Corresponding author: