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Where are we coming from and where are we going: Comprehensive Multisensory Multimodal Integration in Gravitationa-wave Astrophysics

The discovery of gravitational waves and their multimessenger fingerprint has opened tremendous opportunities for astrophysics. Extraordinary instrumental breakthroughs in gravitational-wave detectors on Earth and in Space, in electromagnetic and in neutrino observatories shall lead to an information explosion during the coming years and decades, rapidly expanding humanity's cosmic and scientific horizon. Multisensory observations of gravitational-wave sources promises opportunities that are complementary to insights gained through traditional means. After decades of focused efforts, the observation of an electromagnetic counterpart to the gravitational-wave event GW170817 by a multitude of instruments highlighted the value of multimessenger astrophysics and indicated that short gamma-ray bursts (GRB) could arise from mergers of pairs of neutron stars, and, more generally, that binary mergers are capable of accelerating particles and producing high-energy emission. Comprehensive Multisensory Multimodal Integration in gravitationa-wave Astrophysics is happening at an accelerated scale promising a bright future and shall bring new opportunities for LIGO, Virgo, Kagra and LISA.

Primary author: Prof. MARKA, Szabolcs (Columbia University)

Presenter: Prof. MARKA, Szabolcs (Columbia University)