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Redefining time-domain astronomy with gravitational waves

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For over three decades, extragalactic high-energy transients were divided into two main classes: long duration gamma-ray bursts (GRBs) from the core-collapse of massive stars, and short duration GRBs from the coalescence of two compact objects. This common notion was confirmed by the ground-breaking discovery of the gravitational wave transient GW170817, which provided direct and unambiguous evidence linking a short GRB to the merger of two neutron stars and to the kilonova AT2017gfo, powered by the radioactive decay of heavy metals.

However, our simple picture of the high-energy sky was recently challenged by observations of long GRBs followed by luminous kilonovae, short GRBs produced by magnetar giant flares, and mysterious fast X-ray transients with little or no gamma-rays. In this talk, I will discuss how gravitational wave observations will help us map the broad diversity.

Primary author: TROJA, Eleonora (University of Rome Tor Vergata)

Presenter: TROJA, Eleonora (University of Rome Tor Vergata)

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