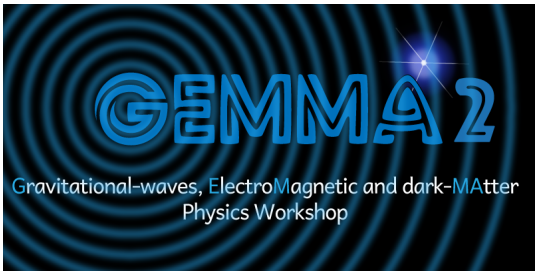

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Multi-Messenger Astrophysics and cosmology with next-generation GRB space missions

Monday, 16 September 2024 17:55 (25 minutes)

The huge luminosity, the redshift distribution extending at least up to z~10 and the association with the explosive death of very massive stars make long GRBs extremely powerful probes for investigating the early Universe (pop-III stars, cosmic re-ionization, SFR and metallicity evolution up to the "cosmic dawn") and measuring cosmological parameters. At the same time, as demonstrated by the GW170817 event, GRBs are a key electromagnetic counterpart of gravitational waves produced by NS-NS and NS-BH merging events. GRB space mission projects for the next decade aim at fully exploiting these unique potentialities of the GRB phenomenon, thus providing an ideal synergy with the very large astronomical facilities of the future (e.g., ELT, CTA, SKA, Athena) and, in particular, with the Einstein Telescope (ET). For instance, the THESEUS mission, under study by ESA as candidate M7 for a launch in 2037, by providing an unprecedented combination of X-/gamma-ray monitors, on-board IR telescope and spacecraft autonomous fast slewing capabilities, would be a wonderful machine for the detection, multi-wavelength characterization and redshift measurement of any kind of GRBs and many classes of X-ray transients. Thanks to these unprecedented capabilities and a perfectly matched timeline with ET, this mission would thus provide at least several tens, and likely more than one hundred, EM counterparts to GW detections, thus greatly enhancing the scientific return of ET for multi-messenger astrophysics and cosmology, as well as extreme and fundamental physics with GRBs.

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