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The future of multi-messenger transient astronomy

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The next decade of Universe exploration is expected to undergo a revolution for the transient astrophysics. The third generation of gravitational-wave (GW) observatories, such as Einstein Telescope (ET) and Cosmic Explorer (CE) will allow us for the first time to observe GWs along the cosmic history back to the cosmological dark ages. These observatories will be an unprecedented resource to address open questions of fundamental physics, astrophysics and cosmology. They will operate in synergy with a new generation of innovative electromagnetic (EM) observatories, such as CTA, Athena, the Vera Rubin Observatory, JWST, ELT, SKA and the mission concepts THESEUS and HERMES. This network of observatories will probe the formation, evolution and physics of binary systems of compact object in connection with kilonovae and short gamma-ray bursts along with the star formation history and chemical evolution of the Universe. The talk will summarize the multi-messenger science case for ET and the perspectives for the next decade.

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