



Contribution ID: 134

Type: **Regular plenary talk**

Gravitational waves from more attractive dark binaries

Thursday, 20 February 2025 09:55 (10 minutes)

The detection of gravitational waves (GWs) has led to a deeper understanding of binaries of ordinary astrophysical objects, including neutron stars and black holes. We point out that binary systems may also exist in a dark sector with astrophysical-mass macroscopic dark matter. These "dark binaries", when coupled to an additional attractive long-range dark force, may generate a stochastic gravitational wave background (SGWB) with a characteristic spectrum different from ordinary binaries. We find that the SGWB from planet-mass dark binaries is detectable by space- and ground-based GW observatories. The contribution to the SGWB today is smaller from binaries that merge before recombination than after, avoiding constraints on extra radiation degrees of freedom while potentially leaving a detectable GW signal at high frequencies up to tens of GHz.

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Session Classification: Cosmology & Fundamental Physics

Track Classification: Cosmology & Fundamental Physics