Gravitational-Wave Universe Accessible with Laser Interferometry

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Albert Michelson realized the concept of a laser interferometer in 1881. Albert Einstein theorized how to describe gravitation correctly in 1915.
They probably didn't know their work would become pillars for exploring the universe via gravitational waves (GWs) 100 years later.
Since the discovery of GW150914, a cosmic GW signal emitted from the coalescence of two stellar-mass black holes (BHs) more than one billion light-years away, the 21st century has opened up the era of the GW universe.
In this colloquium, I'll introduce GW astrophysics and highlight recent progress. I'll also briefly touch on the km-scale laser interferometers used in GW observation, such as LIGO (USA), Virgo (Europe), and KAGRA (Japan).
Toward the end, I'll have a few remarks on R&D efforts to develop third-generation detector concepts such as the Einstein Telescope and Cosmic Explorer.
Within a few decades, GW observation may shed light on some of the big questions about the universe and how gravity works.