



NEw WindowS on the universe and technological advancements from trilateral EU-US-Japan collaboration

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Abstract: NEWS promotes the collaboration between European, US and Japanese research institutions in some key areas of fundamental physics. LIGO and Virgo collaborations have built the largest gravitational wave observatories and exploit the propagation of light and spacetime to detect gravitational waves and probe their sources. The first observation of a signal from a merging black hole system has inaugurated the era of gravitational wave astronomy. The Large Area Telescope collaboration operates a gamma-ray telescope onboard the Fermi Gamma Ray Space Telescope mission and has revolutionized our view of the gamma-ray Universe, by increasing the number of known sources, unveiling new classes of gamma-ray emitters, and probing particle acceleration and electromagnetic emission in space with unprecedented detail. Fermi is the reference all-sky gamma-ray monitor for the follow-up searches for electromagnetic counterparts of gravitational wave sources. The multimessenger astronomical observations will soon be enriched by X-ray polarization detectors. New-generation space telescopes will measure the polarization of X-rays from the cosmic sources and probe the laws of physics under extreme conditions of gravitational and electromagnetic fields. A complementary approach to probe the Universe is provided by particle accelerators built in laboratories. FNAL will provide the cleanest probes for physics beyond the Standard Model of particle physics. The Muon ($g-2$) experiment will measure the muon anomalous magnetic moment with unprecedented precision. Mu2e will search for the neutrinoless coherent muon conversion to an electron in the Coulomb field of a nucleus, which would be the unambiguous evidence of new, unknown, physics. These endeavors require innovative detectors and cutting-edge technologies that NEWS will develop to open new “windows” in fundamental physics.

