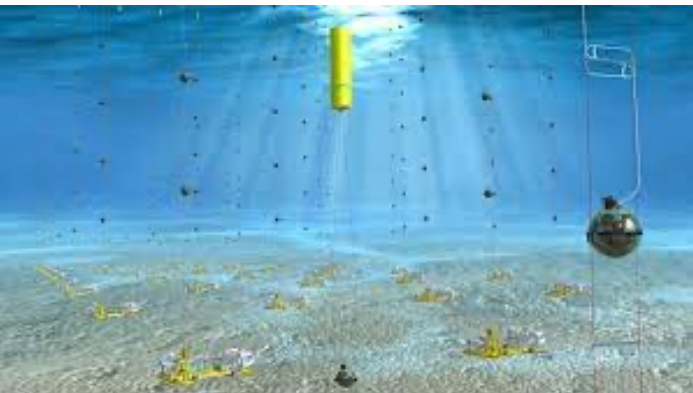


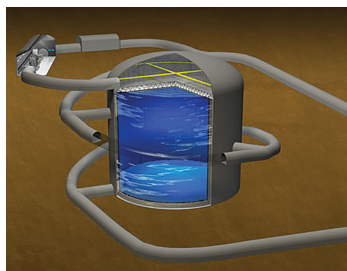
Instruments for Astroparticle Physics & MMA



Neutrinos



HyperK

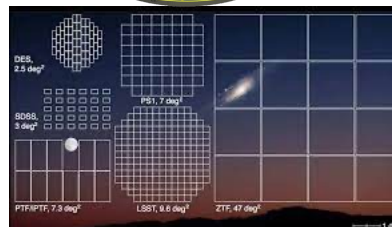
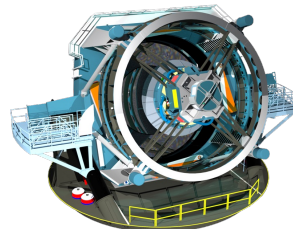


Photons

SVOM



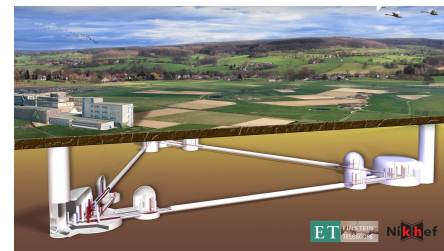
LSST



Virgo



Ondes Gravitationnelles



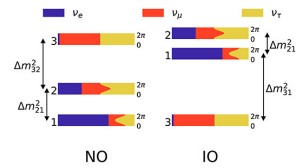
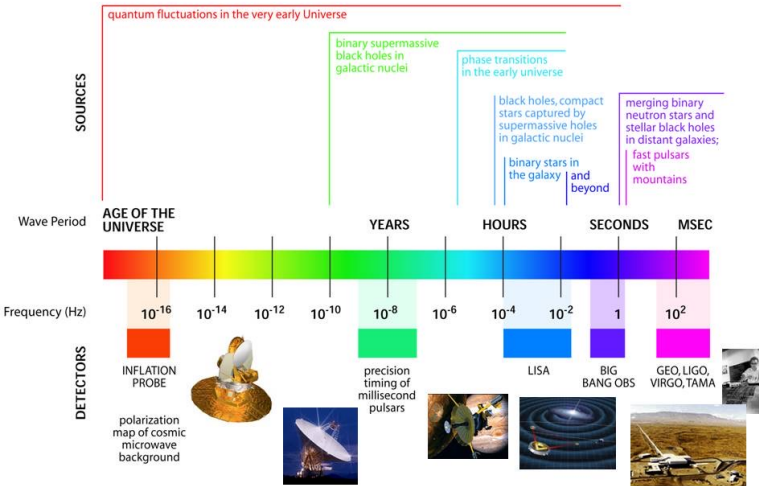
Einstein Telescope



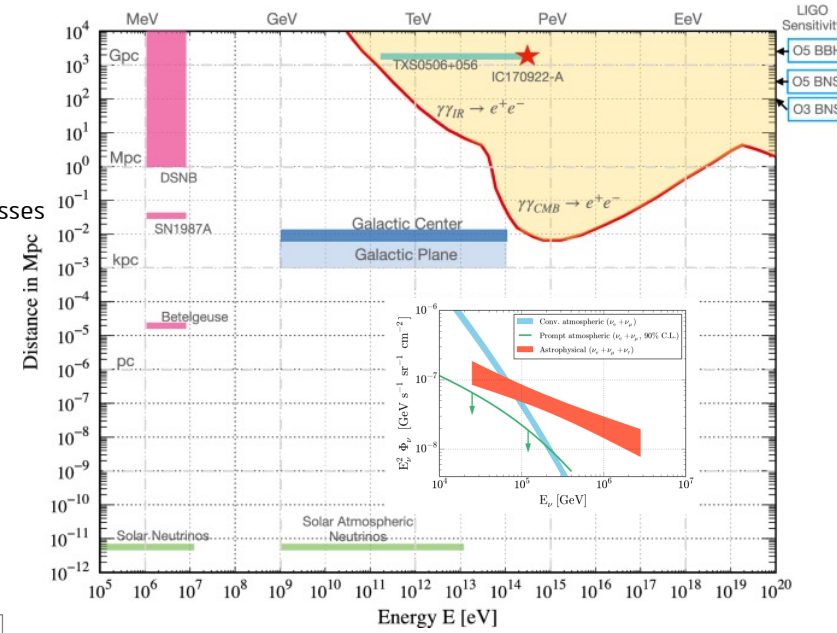
Multimessenger signals : EM, HEN, GW



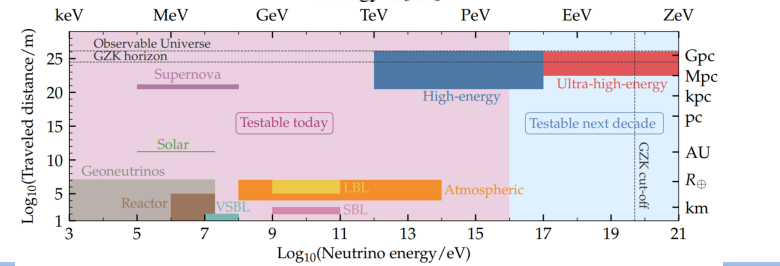
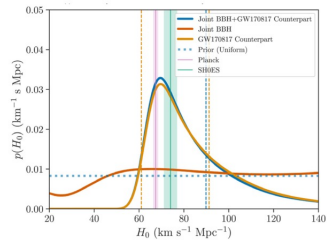
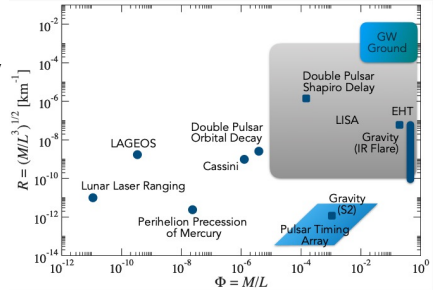
THE GRAVITATIONAL WAVE SPECTRUM



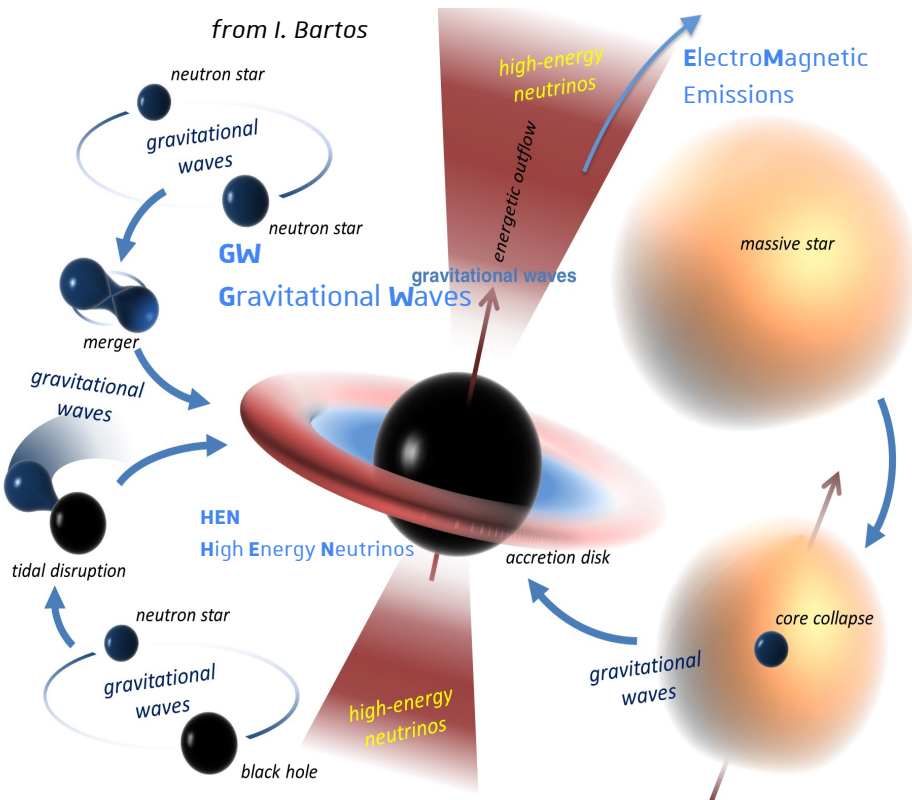
Neutrino properties / masses
Lorentz violation
+ Sources cosmic-rays



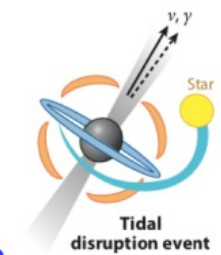
Tests of General Relativity
Cosmology...
+ Sources GW



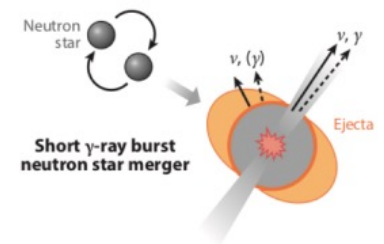
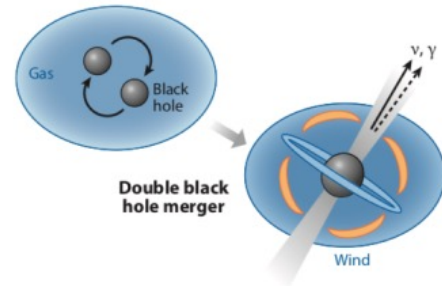
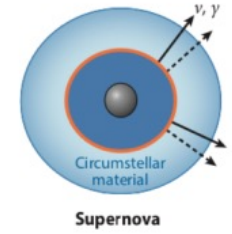
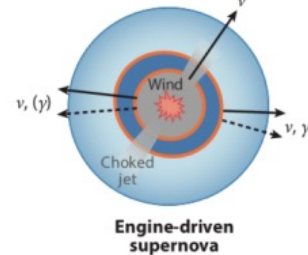
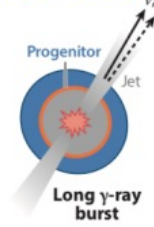
Multimessenger signals : EM, HEN, GW



Neutrinos + Lumière

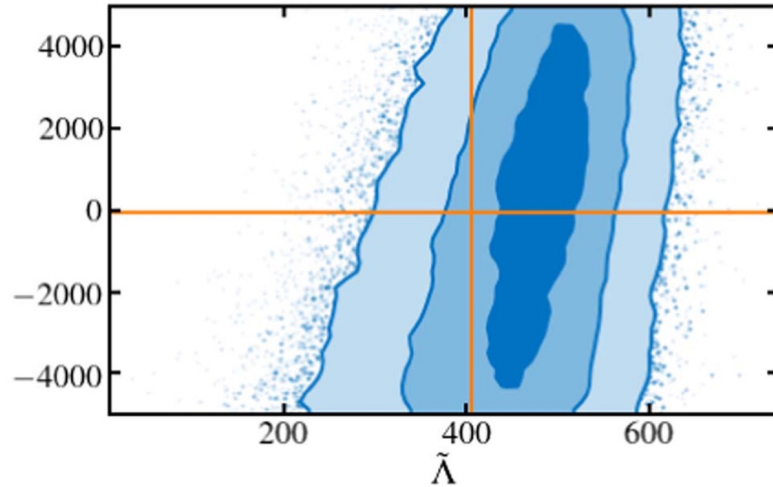


OG + Neutrinos + Lumière

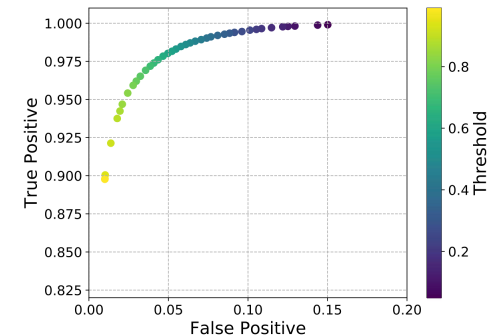
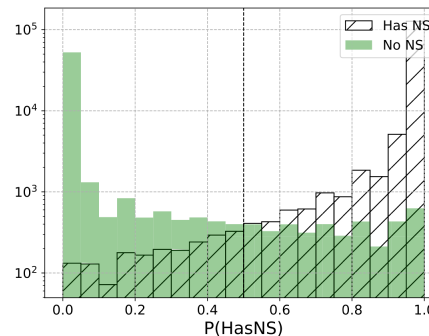
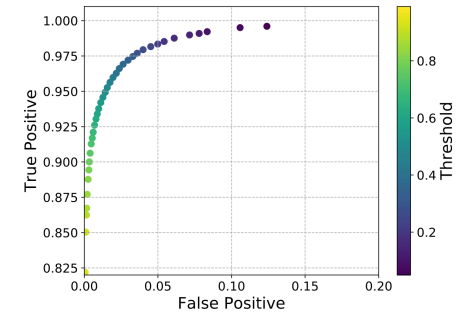
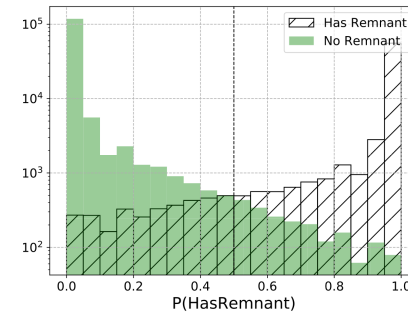


BILBY - Ashton et al. ApJS 241, 27 (2019)
<https://iopscience.iop.org/article/10.3847/1538-4365/ab06fc/pdf>

Chatterjee et al. ApJ 896, 1 (2020)
<https://iopscience.iop.org/article/10.3847/1538-4357/ab8dbe/pdf>



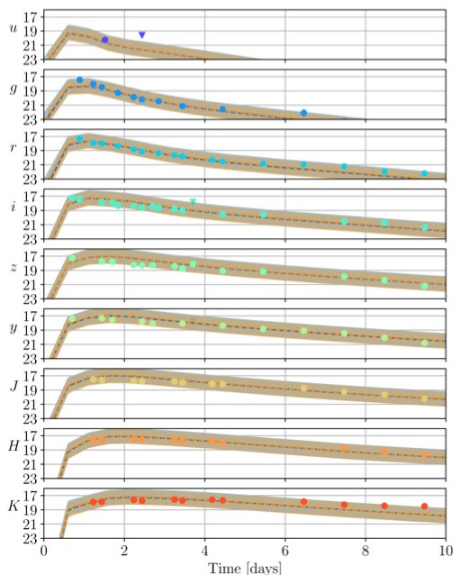
$$\Lambda = \frac{2k_2}{3} \left(\frac{c^2 R}{Gm} \right)^5$$



<https://arxiv.org/abs/2205.08513>

NMMA: A nuclear-physics and multi-messenger astrophysics framework to analyze binary neutron star mergers

Peter T. H. Pang^{1,2}, Tim Dietrich^{3,4}, Michael W. Coughlin⁵, Mattia Bulla⁶, Ingo Tews⁷, Mouza Almualla⁸, Tyler Barna⁵, Weizmann Kandrebeogo^{9,10}, Nina Kunert³, Gargi Mansingh^{5,11}, Brandon Reed^{5,12}, Niharika Sravan¹³, Andrew Toivonen⁵, Sarah Antier¹⁰, Robert O. VandenBerg⁵, Jack Heinzl¹⁴, Vsevolod Nedora⁴, Pouyan Salehi³, Ritwik Sharma¹⁵, Rahul Somasundaram¹⁶, Chris Van Den Broeck^{1,2}



Includes r-process, nuclear EoS...
(below GW170817 / AT2017gfo / GRB170817)

