Neutrino physics : *a personal perspective*

Experiments

Low energy beta-beam

Volpe, Journ. Phys. G30, 2004

Ganil, GSI, Isolde
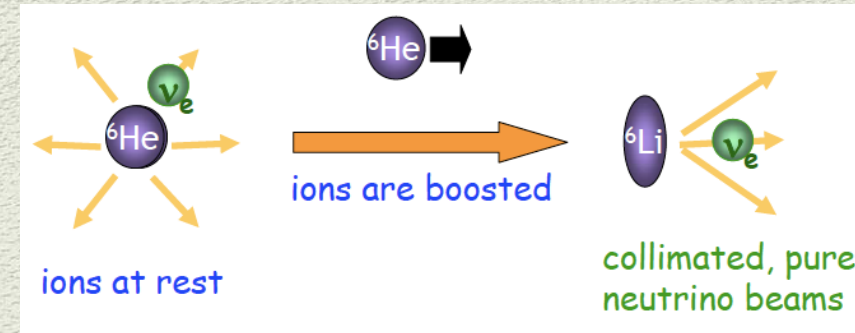
Cosmology

Neutrino properties, flavor mechanisms,

cosmological neutrino detection

Lazauskas, Vogel, Volpe, J.Phys.G. 35, 2008

neutrino quantum kinetic equations

Froustey, Pitrou, Volpe, JCAP 12, 2020

$N_{eff} = 3.0440$

Nuclear Physics

neutrino-Pb cross section, SN signal

Volpe et al, PRC65, 2002; Engel et al, PRD67, 2003
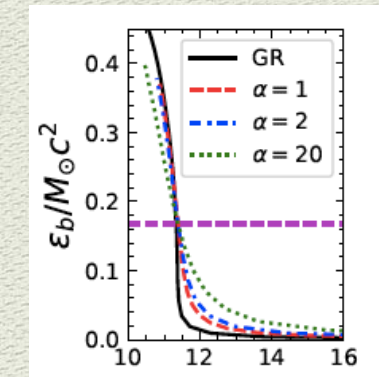

HALO
(SNOLAB)

Gravitation

Gravity effects - ex. neutrino decoherence

Chatelain, Volpe, PLB 801, 2020

Neutrinos and EGR
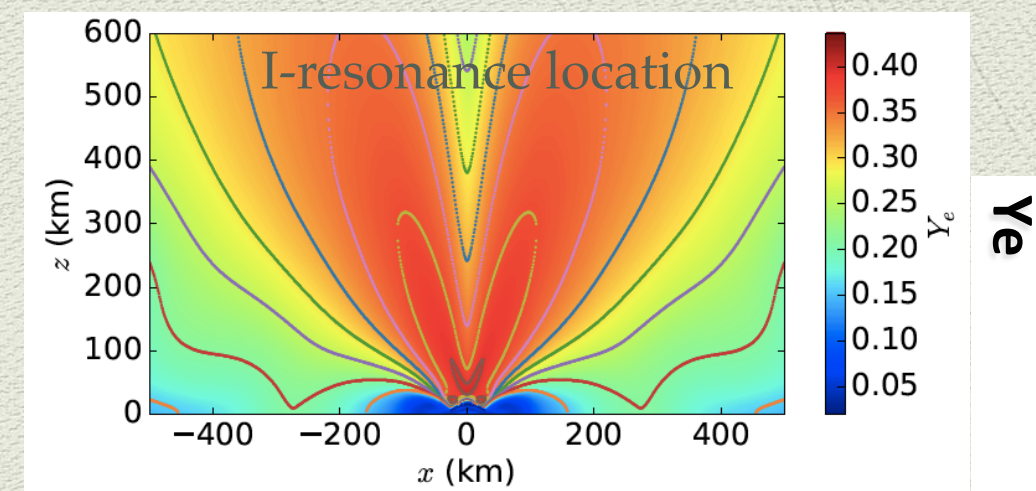
Gallo Rosso, Abbar, Vissani, Volpe, JCAP 12, 2018

Neutrino Physics

Neutrino astrophysics

many-body approaches (BBGKY) and neutrino propagation
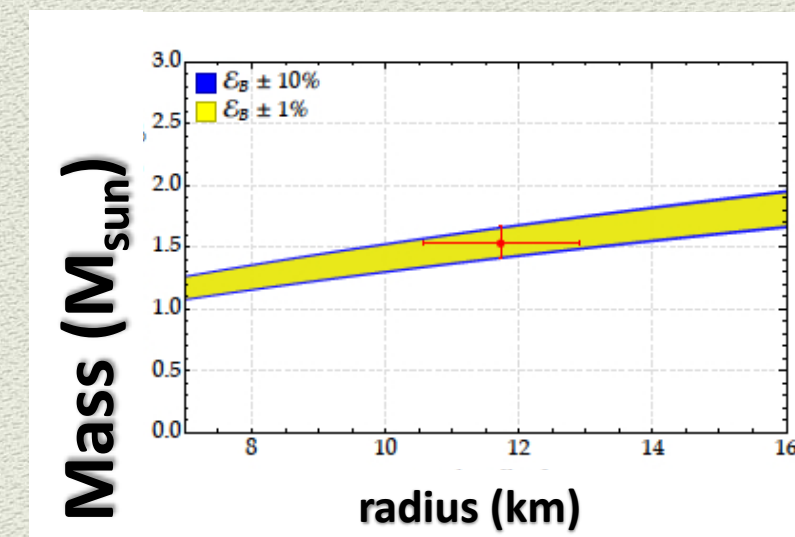
Volpe et al, PRD87, 2013

Flavor conversion, non-standard properties and the r-process

Chatelain, Volpe, PRD98 (2018)

Astroparticle physics

Properties of neutrinos or of astrophysical sources - ex. mass-radius of NS

Gallo Rosso, Vissani, Volpe, JCAP11, 2017

There is a fundamental unity,
applications in different domains

> the information that we bring

> the methods we use across fields

> object that we study to learn about the sources that
produce them, or the media they traverse

> our searches for new properties, novel particles
or interactions, new physics

Richness and complexity of interdisciplinary or transversality,
bring new ideas, solutions to open problems and open novel directions