

**(Maria) Cristina Volpe** - currently at the Astroparticle and Cosmology (APC) Laboratory since 2012 previously at the Institute of Nuclear Physics Orsay (1997-2011)  
Spent periods at Milano U., Niels Bohr Institute Copenhagen, Institut fuer Theoretische Physik Heidelberg, Institut d'Astrophysique Paris (IAP)

■ I am a theoretical neutrino physicist and astrophysicist, and a many-body theorist (nuclear physics)

■ Since 1998, Permanent researcher of the French National Center for Research (CNRS).

■ **Research (sketch):**

➔ 1992-on Working in nuclear physics as a **many-body theorist, collective nuclear modes** (Giant Resonances), on **weak nuclear processes** - beta-decay and **neutrino-nucleus cross sections at low energy (100 MeV energy range)**, including  $^{12}\text{C}$ ,  $^{208}\text{Pb}$ , but also  $^{56}\text{Fe}$ .

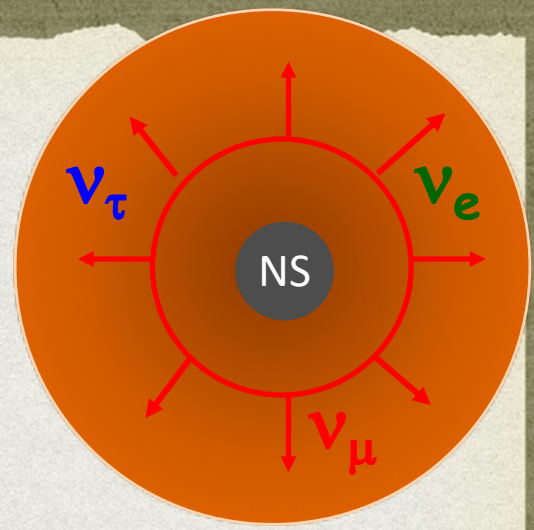
➔ 1997-98 I performed Shell Model and QRPA calculations to solve the discrepancy between measured and predicted  $^{12}\text{C}$  inclusive and exclusive cross sections; showing it was coming from missing correlations. Conclusions in agreement with the ones of Hayes et al.

➔ 2004 - I suggest a **low energy beta-beam facility**  
Purpose: neutrino astrophysics, measurement of (low energy) neutrino-nucleus cross sections, fundamental tests  
Feasibility EC Study within the EURISOL Design study (ended 2009). I contributed and lead the study of the physics potential of the low energy beta-beam.

Made predictions also for spallation facility at Lund, ESS.

➔ 2000, 2003, 2011 - I made **predictions for Lead, also in relation with HALO(-2)**. Results are used in SnowGLOBES for example.

## Research:



➔ Since 2000- **Working on key open issues in neutrino physics, at the interface also with astrophysics and cosmology.**

**Key aspects I worked on** include CP violation effects in supernovae,  $\theta_{13}$  (before its measurement), the DSNB, future supernova signals and new physics, neutrinos at the BBN epoch, neutrino evolution equations and quantum kinetic equations in dense environments - core-collapse supernovae, binary neutron star merger remnants, accretion disks around black-holes and early universe, etc...

**My goals include** understanding how neutrinos change flavor in dense environments, suggest ways to learn about key unknown neutrino properties using astrophysical neutrinos, making predictions for experiments such as e.g. for the DSNB, and experiments like DUNE, JUNO, Super-K and Hyper-K.

➔ 2011 - Nominated **Fellow of the American Physical Society**, by the Division of Nuclear Physics  
« For her work on neutrino-nucleus interactions and understanding the role of neutrinos in astrophysical sites, and for her suggestion of building a source of low-energy beta beams using the beta decay of radioactive nuclei.»

