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The short term scientific missions named *Astrophysical applications of the nuclear response function in infinite matter* has been regularly done in Lyon for the period 09/06/14 to 14/06/14 has been very fruitful from the scientific point of view. As signaled in date my e-mail of 26 May 2014, the mission has been reduced to one week only. This was due to a sudden change in the agenda of my collaborator (D. Davesne).

Purpose: The aim of my STSM in Lyon at IPNL (4 rue E. Fermi, 69100 Villeurbanne -France) has been to progress on the numerical code to calculate neutrino mean free path. This is a very important tool since it allows us to calculate the cross section of different processes involving the interaction between neutrinos and nucleons. One of the crucial features that are now available within the code is the possibility of using the non-standard the Brussels-Montreal Skyrme functionals (BSk). These functionals are largely used by the astrophysical community since they are able to describe with a reasonable number of parameters both properties of finite nuclei and to respect some important astrophysical constraints. At difference from standard Skyrme functionals, they contain some extra terms, and this has obliged us to modify the numerical code to take them properly into account. Moreover, we fixed our numerical code to calculate extending it to the charge-exchange process, which are also very important for the astrophysical community.

Work and results: The first part of the mission has been devoted to the implementation of the new features previously discussed into the numerical code. This has been done in close collaboration with D. Davesne and J. Navarro (IFIC- Seville, Spain). The second part of the mission has been devoted to the interpretation of the numerical results

and the writing of an article on the subject.

Future collaborations: The STSM has been very fruitful and we have found very efficient the 5 days stay for our collaborations. Moreover it has given me also the opportunity to start a new collaboration with H. Haensen (IPNL) on the properties of two-protons emitters at the proton drip-line. This will be more likely the subject for a next STSM in the near future.

Publications: During the STSM, I had the time to finish the article, which will be submitted in the next days.

- Title: *Linear response theory and neutrino mean free path using Brussels-Montreal Skyrme functionals*; A. Pastore, M. Martini, D. Davesne, J. Navarro, S. Goriely and N. Chamel, to be submitted to Phys. Rev. C

I have inserted in the acknowledgment section the statement *This work has been supported by NewCompstar COST Action MP1304*.

In order to give the possibility of an external control on my activity, i also give the coordinates of D. Davesne, wiith whom I have worked during these 5 days, e-mail: davesne@ipnl.in2p3.fr, office-phone: +33 4 72 44 81 43.

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