

SEPTEMBER 17-22, 2023
Saint-Pierre d'Oléron | FRANCE



BEYOND THE STANDARD MODEL OF WEAK INTERACTION: nuclei, neutrons, neutrinos

FIRST CIRCULAR

April 2023

Twenty years after the “*Physique nucléaire et interaction faible*” edition of 2003, the *École Joliot-Curie* takes a new and modern look at the field of weak interaction and beta decay. This year’s edition will cover the search of physics Beyond the Standard Model in the weak sector addressed at low energy by ultra-high precision experiments in three communities: the one of nuclear beta decay, of cold and ultra-cold neutrons and of neutrinos.

The common denominator is beta decay at the nucleon or nuclear level, and how it is used to probe New Physics (NP) at the TeV energy scale, with results competitive with direct searches at high energy.

The school will propose two theoretical courses on which all other courses will draw. The first one will cover the description of the electroweak interaction in the Standard Model and Beyond using the new prescription of Effective Field Theories (EFTs). The second one will focus on beta decay, going from its textbook description derived from the historical discoveries of its properties to its most modern description in the context of EFTs.

Three other courses will be proposed, each presenting the objectives and technical challenges tackled in the high precision experiments of the three communities. Nuclear beta decay $\mathcal{F}t$ values, correlation and beta spectrum shape measurements will be covered to show how the most stringent constraints on NP are still derived from nuclear beta decay to this day. Neutron beta decay half-life and correlation measurements will be presented, as well as how ultra-cold neutrons are used to test CP violation. The field of $\beta\beta 0\nu$ experiments is very active and growing, and an overview will be given with a description of the detection techniques used in the different experiments. Finally, the question of the reactor antineutrino spectrum and how it raised questions about possible NP will be discussed.

This year’s edition will again take place at La Vieille Perrotine, a CNRS resort located on the Oléron island along the French Atlantic coast, from September 17th to 22nd. It is accessible from the TGV train station of La Rochelle and the airports of La Rochelle and Bordeaux:

<https://www.caes.cnrs.fr/sejours/la-vieille-perrotine/>

Participants are expected to arrive on the afternoon of Sunday September 16th and leave on Friday September 22nd after lunch.

Pre-registration is open from April 1st to May 31st. Details on the registration procedure, and the school in general, can be found at:

<https://ejc2023.sciencesconf.org/>

Acceptance will be communicated by e-mail before June 1st, along with the procedure to follow for the final registration and payment.

On behalf of the Organizing Committee:

M. Versteegen, B. Blank, S. Grévy, F. Cadou, P. Chambon, L. Giot, S. Roccia, L. Thulliez.