ECT*

EUROPEAN CENTRE FOR THEORETICAL STUDIES IN NUCLEAR PHYSICS AND RELATED AREAS

TRENTO, ITALY

Institutional Member of the European Expert Committee NUPECC

Precise beta decay calculations for searches for new physics

Trento, April 8-12, 2019

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Organizers:

Daniel Phillips (Ohio University)

Doron Gazit (Hebrew University)

Alejandro Garcia (Univ. of Washington)

Ines Campo (ECT*) – secretary in charge

Financial Support:

Those who are supported have received e-mails indicating that.

Note that you are not reimbursed, you just posteriori don't have to pay.

2018-19 workshops about the subject:

AMHERST CENTER FOR FUNDAMENTAL INTERACTIONS

Physics at the interface: Energy, Intensity, and Cosmic frontiers

University of Massachusetts Amherst

"BETA DECAY AS A PROBE OF NEW PHYSICS", NOV. 1-3, 2018

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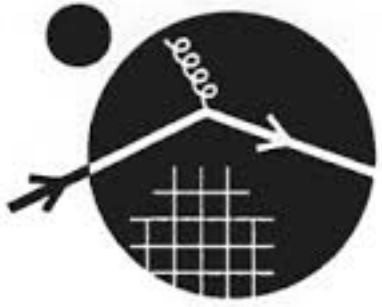

INSTITUTE for NUCLEAR THEORY

Fundamental Symmetries Research with Beta Decay

November 4 - 8, 2019

Our motivation:

- Ongoing experimental efforts worldwide are doing searches for new physics by precision measurements of beta decay observables.
- These experiments, which aim at less than per-mille level precision, can compete or surpass LHC constraints.
- Indeed, new generation campaigns have high enough statistics to reach these targets. However, at these levels, Standard Model predictions have to include different “small”, mostly nuclear dependent, corrections, e.g., finite-nuclear size effect on Coulomb corrections, radiative corrections, recoil order corrections and more.
- There is presently no coherent theoretical effort that accompanies the experimental campaigns. In order to have meaningful results and to establish possible limits to the accuracy of the calculations we propose a dedicated workshop whose product would be clear prescriptions for the corrections and possible limitations.

In short:

- We want to introduce the challenges and opportunities of precision beta decay studies to the leading theorists who calculate and study nuclear structure.
- We aim to understand the accuracy and limits of current nuclear calculations, and see if they meet the needs set by the experimental precision.
  - And… in the process… introduce the leading theoretical calculations, methods, and experts to the experimentalists.
- We want to strengthen the dialogue between experimentalists and theorists, e.g.,
  - should we choose new experiments according to how accurate can the nuclei be calculated?

Structure of the workshop

- Monday: review talks focusing on ongoing experiments.
- Tuesday: radiative corrections.
- Wednesday: introduction of the leading and sub-leading operators that need to be calculated.
  - (Wednesday afternoon: a detour from the main topic – discussion on neutrino-less double beta decay effective operators)
- Thursday: state of the art nuclear calculations.
- Friday: uncertainty quantification and summary

One more thing

- Up-to-date program appears at:
  - https://indico.ectstar.eu/event/42/overview
- Presentations (in pdf format) will appear at the INDICO page as well
- Please send your presentation to one of the organizers