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Strongly-interacting few-fermion systems in a trap

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Small open quantum systems are intensely studied in various fields of physics. The properties of such systems are profoundly affected by their environment, such as the continuum of decay channels. In spite of their specific features, they also display generic properties that are common to all weakly bound/unbound systems close to threshold. This implies that similar universal few- and many-body phenomena can be studied, and that concepts and methodologies from different fields of physics can be used.
Recent progress in the field of cold atomic gases offers new opportunities to study universal questions related to the behavior of strongly interacting Fermi gases. These systems can be prepared with very high fidelity, and relevant parameters such as particle numbers, interaction strengths and dimensionality can be tuned. In this talk we will mainly be concerned with a one-dimensional system of trapped two-component fermions; and we will present very accurate theoretical models, for which we employ sophisticated many-body techniques from nuclear physics, that allows to understand the structure of such systems as a function of the interaction strength, as well as the decay of particles in the situation where the trapping barrier is lowered.

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