Symposium Loosely-Bound States – From the Coldest to the Hottest Environments (SYLB)

Benjamin Dönigus
Goethe University Frankfurt am Main
Max-von-Laue-Straße 1
60438 Frankfurt am Main, Germany
b.doenigus@gsi.de

An interesting field of active research is the study of loosely-bound states that have direct connections to basic quantum physics. Such loosely-bound systems are created in many different quantum systems, namely in ultra-cold quantum gases, in nuclear physics and even in high-energy nucleus collisions, e.g. at LHC energies. One example is the hypertriton that can be seen as a bound state of a Lambda hyperon and a deuteron, with a Lambda separation energy of only 130 keV. That low energy leads to a distance between the deuteron core and the Lambda of 10.6 fm, making it the ultimate halo nucleus. This interesting object is produced copiously in heavy-ion collisions at the Large Hadron Collider at CERN, where temperatures of 156 MeV are reached, i.e. hundred thousand times hotter than the interior of the sun. The hypertriton is close to an Efimov state, i.e. a shallow 3-body bound system with universal properties. Other known halo nuclei, for instance 11Li, can also be understood as Efimov states whereas the two neutrons surround a 9Li core, these are then often called Borromean nuclei. Similar systems are also formed from atoms in magnetic traps near absolute zero temperature where the binding energy can be tuned by adjusting the magnetic field.

Overview of Invited Talks and Sessions

(Lecture hall ZHG104)

Invited Talks

SYLB 1.1	Mon	10:45–11:25	ZHG104	**Fermion Pairing and Correlation at Ultralow Temperatures** — •Philipp Preiss
SYLB 1.2	Mon	11:25–12:05	ZHG104	**The structure of loosely-bound nuclear states: when the tail wags the dog** — •Hans-Werner Hammer
SYLB 1.3	Mon	12:05–12:45	ZHG104	**Fragile Matter in Extreme Conditions: insights from the LHC** — •Francesca Bellini

Sessions

SYLB 1.1–1.3	Mon	10:45–12:45	ZHG104	**Loosely-Bound States – From the Coldest to the Hottest Environments**