Neutron-rich, EXotic, heavy nuclei produced in multi-nucleon Transfer reactions

Fact Sheet

Project Information

NEXT
Grant agreement ID: 803740

Status
Ongoing project

Start date
1 September 2019

End date
31 August 2024

Funded under
H2020-EU.1.1.

Overall budget
€ 1 670 323

EU contribution
€ 1 670 323

Hosted by
RIJKSUNIVERSITEIT
GRONINGEN
Netherlands

Project description

Neutron-rich nuclei shed light on the formation of heavy elements

Objective
The heaviest element which has been found in nature is uranium with 92 protons. So far, the elements up to atomic number 118 (oganesson) have been discovered in the laboratory. All transuranium elements are radioactive and their production rates decrease with increasing number of protons. An Island of Stability, where the nuclei have relatively long half-lives, is predicted at the neutron number 182 and, depending on the theoretical model, at the proton number 114, 120 or 126. Current experimental techniques do not allow to go so far to the neutron-rich side close to the Island of Stability.

The observation of gravitational waves as well as electromagnetic waves originating from a neutron star merger has been published on October 16, 2017 and is a first proof of the nucleosynthesis of heavy elements in the r-process. It still remains an open question if superheavy nuclei have been formed in our universe. To answer these questions, we need insight into the nuclear properties of the heaviest elements and how these properties evolve when one moves toward to the neutron-rich side on the nuclear chart.

In the NEXT project, I will set out to discover new, Neutron-rich, EXotic heavy nuclei using multi-nucleon Transfer reactions. I will measure their masses and, thus, pin down the ground state properties of these nuclei. These studies provide insight into the evolution of nuclear shells in the heavy element region. Furthermore, I will measure the fission half-lives of these isotopes. In order to realize the NEXT project, I will built a novel spectrometer, which is a combination of a solenoid separator and Multi-Reflection Time-of-Flight Mass Spectrometer.

The broad experience in heavy element research and mass measurements that I have acquired over the years, and the unique infrastructure at my home institute that houses the AGOR accelerator, makes it so that I am ideally placed to start and lead the NEXT project.

Field of science
/natural sciences/physical sciences/astronomy/stellar astronomy/neutron star
/natural sciences/physical sciences/astronomy/observational astronomy/gravitational waves
/natural sciences/chemical sciences/inorganic chemistry/inorganic compounds

Programme(s)

Topic(s)

Call for proposal

ERC-2018-STG
Funding Scheme

ERC-STG - Starting Grant

Host institution

RIJKSUNIVERSITEIT GRONINGEN

Address
Broerstraat 5
9712CP Groningen
Netherlands

Activity type
Higher or Secondary Education Establishments

EU contribution
€ 1 670 323

Website
Contact the organisation

Beneficiaries (1)

RIJKSUNIVERSITEIT GRONINGEN

Netherlands

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€ 1 670 323

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9712CP Groningen

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