Neutron captures constrain stellar nucleosynthesis

Fact Sheet

Project information

**NAUTILUS**

Grant agreement ID: 615126

Status

Closed project

Start date

1 April 2014

End date

31 March 2019

Funded under:

FP7-IDEAS-ERC

Overall budget:

€ 1 871 596

EU contribution

€ 1 871 596

Hosted by:

JOHANN WOLFGANG GOETHE-UNIVERSITAT FRANKFURT AM MAIN

Germany

Objective

"NAUTILUS will investigate the nucleosynthesis of the chemical elements during the evolution of stars, which is the basis for understanding the chemical history of the Universe. The vast majority of the elements heavier than iron are produced by neutron capture reactions. The precise knowledge of the involved neutron capture cross sections for certain isotopes sets tight limits for stellar parameters and puts strong constraints on the age of the Universe.

Accurate measurements of the key nuclear reactions in the mass region around the radioactive 85Kr will lead to the improvements needed to characterize the production processes of the elements in stars. The respective high-accuracy abundance patterns in single stars can then be interpreted as diagnostic tools for the deep stellar interior and the isobaric 87Sr/87Rb chronometer constraints the history of the Universe.

The neutron capture cross section of radioactive isotopes for neutron energies in the keV region will be measured by a time-of-flight (TOF) experiment. NAUTILUS will provide a unique facility realizing the TOF technique with an ultra-short flight path at the FRANZ setup at Goethe University Frankfurt am Main, Germany. A highly optimized spherical photon calorimeter will be built and installed at an ultra-short flight path."
NAUTILUS opens new horizons in the area of neutron-induced reaction research, as smallest samples like of 85Kr - which will be produced as an isotopically pure radioactive sample - will become measureable in reasonable times.

Future applications include the study of neutron capture cross sections important for next generation nuclear reactors: For the first time the high neutron fluxes needed to study the mass region of interest in the keV energy range will be available.

Field of Science

/natural sciences/chemical sciences/inorganic chemistry/inorganic compounds
/humanities/history and archaeology/history
/social sciences/economics and business/economics/production economics

Programme(s)

FP7-IDEAS-ERC - Specific programme: "Ideas" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Topic(s)

ERC-CG-2013-PE2 - ERC Consolidator Grant - Fundamental Constituents of Matter

Call for proposal

ERC-2013-CoG

See other projects for this call

Funding Scheme

ERC-CG - ERC Consolidator Grants

Principal Investigator

Rene Reifarth (Prof.)

Host institution
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<tr>
<th>Address</th>
<th>Activity type</th>
<th>EU Contribution</th>
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<tr>
<td>Theodor W Adorno Platz 1</td>
<td>Higher or Secondary Education</td>
<td>€ 1 871 596</td>
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<td>60629 Frankfurt Am Main</td>
<td>Establishments</td>
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**Website**

**Contact the organisation**

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<th>Administrative Contact</th>
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<tbody>
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<td>Rene Reifarth (Prof.)</td>
<td>Kristina Wege (Ms.)</td>
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**Beneficiaries (1)**

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