New Masterclasses For Nuclear Astrophysics

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What are we working on?

- Development of two Nuclear Astrophysics Masterclasses
  - one-day outreach events for high school students, introducing them to modern research
  - First masterclass materials available @ mc.chetec-infra.eu/
  - Second masterclass currently in development
- Languages
  - **Finished: German**, **English**, **Italian**, **French**, **Czech**, **Bulgarian, Upper Sorbian**
  - Not finished: Spanish, Romanian, Swedish, Hungarian, Lithuanian, Catalan, Hebrew, Welsh

Content & Materials

- **Centerpiece** of the masterclass:
  Analysis & evaluation of a **nuclear physics experiment**
- Measurement carried out at the
  Felsenkeller underground ion accelerator lab
- **Tasks** of the learners:
  - Gamma spectroscopy & peak measurements
  - Usage of a term diagram, consideration of background
  - Determination of the cross section & reaction rate
- **Goals**:
  - Working as a nuclear physicist for one day
  - Gain an insight into the laboratory and the working methods of a nuclear physicist

Data Analysis Webtool

Content & Materials

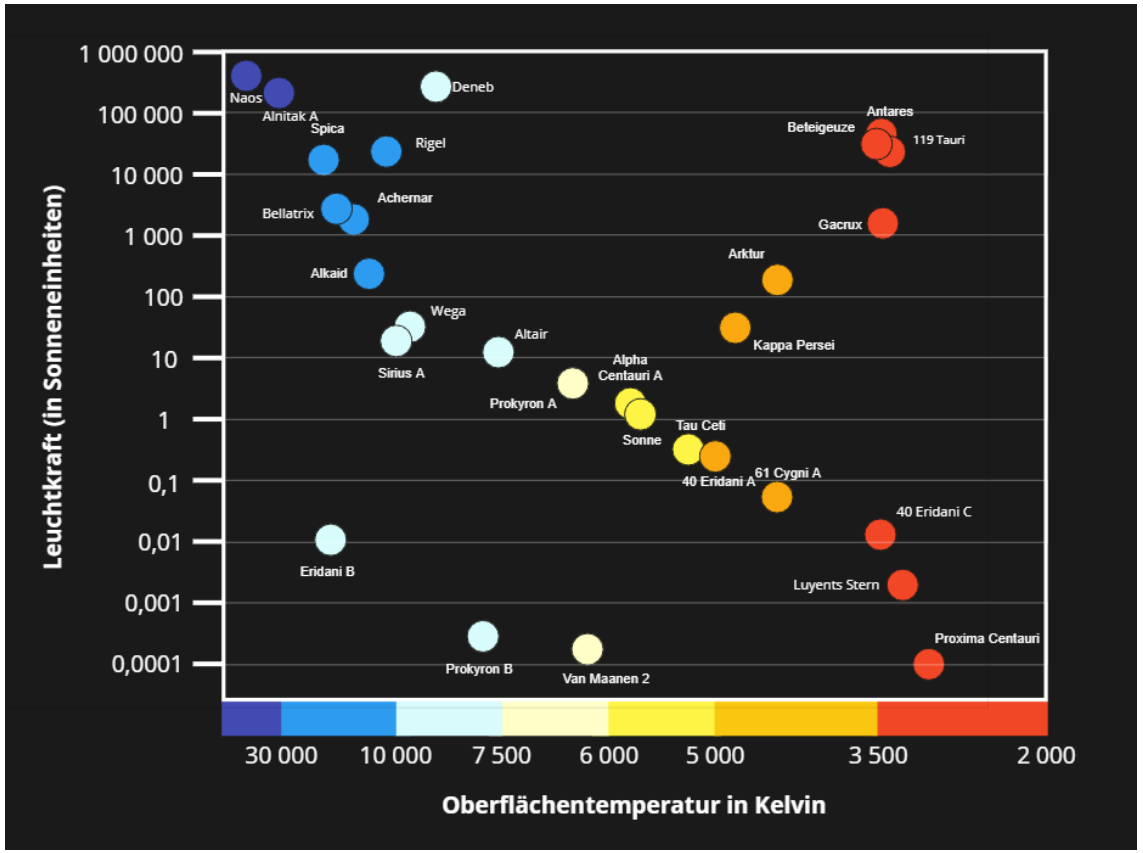
- **Various Lectures** linking the activities
- **Videos & Visualizations**
  - Camera tour through the Felsenkeller underground laboratory
  - Astronuclear Nibbles – Video series
  - Interactive Nuclide Chart

Felsenkeller Laboratory

Astronuclear Nibbles:
https://youtu.be/L6NMurf64-4

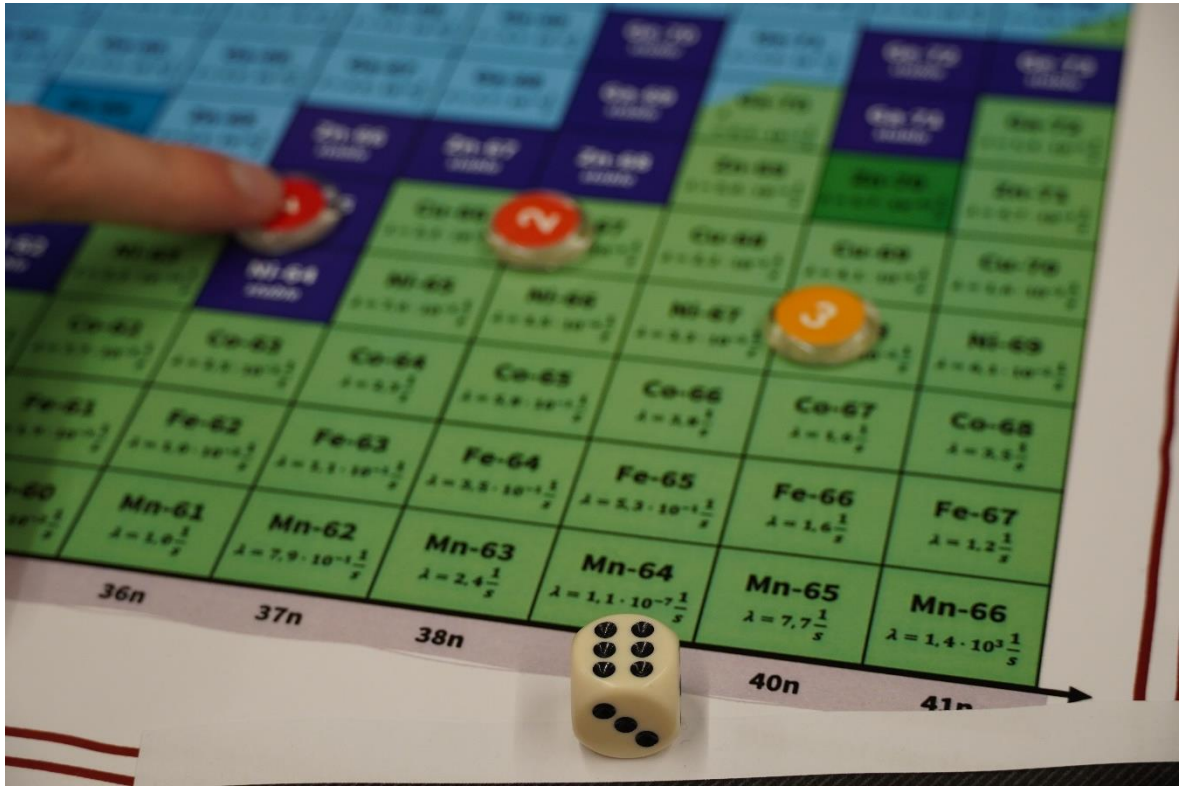
Content & Materials

- **Various Lectures** linking the activities
- **Videos & Visualizations**
- **Multiple Activities** with gamification elements, e.g. …
  - Collaboratively create a Hertzsprung–Russell diagram together



Content & Materials

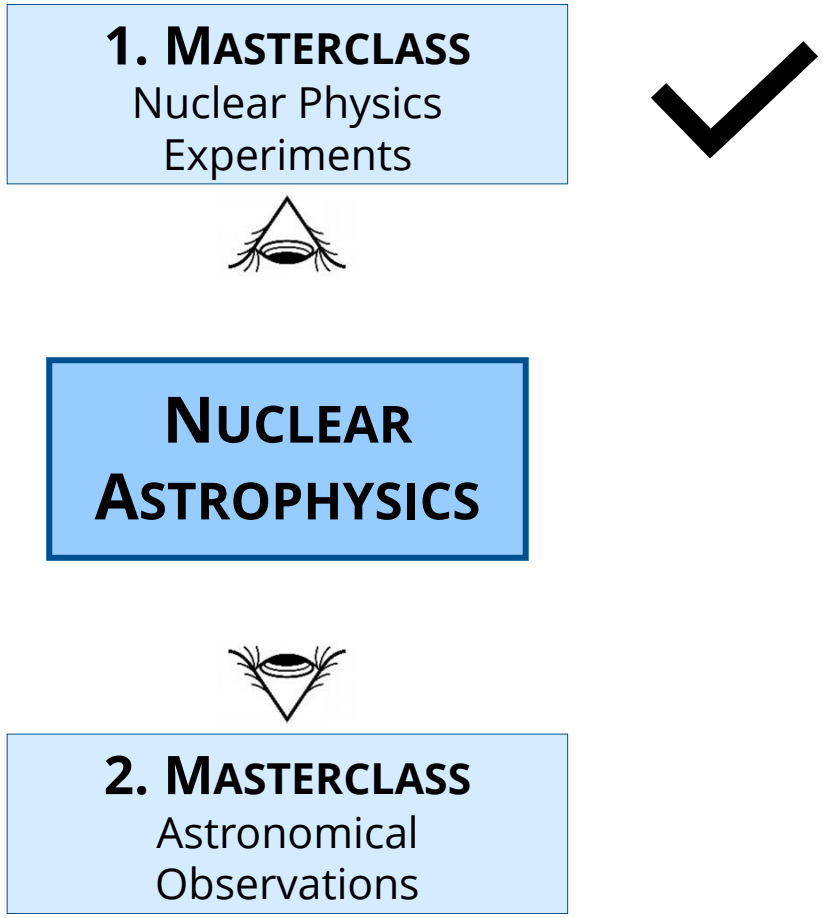
- **Various Lectures** linking the activities
- **Videos & Visualizations**
- **Multiple Activities** with gamification elements, e.g. …
  - Collaboratively create a Hertzsprung–Russell diagram together
  - The Nuclei Race: Recreating s- and r-processes in a board game



Content & Materials

Two different Masterclasses

- Access to nuclear astrophysics from different points of view
- No necessity to visit the first Masterclass to understand the second
- Two independent Masterclasses
  - Each scientist can choose their preferred topic



Content & Materials

Second Masterclass

- Currently under development
- Stellar spectroscopy as the central data analysis
  Stellar Analysis Pipeline by Johannes Puschnig
- Cosmological lithium problem & primordial nucleosynthesis as main themes
- Focus on addressing cosmological problems with the help of nuclear astrophysics *(big bang models via primordial Nucleosynthesis)*

1. Masterclass
Nuclear Physics Experiments

Nuclear Astrophysics

2. Masterclass
Astronomical Observations

Masterclass Events

- **Masterclass Run Throughs**
  - @ schools and school Labs in Germany
  - with high school students between the age of 14 and 18 Yrs

Masterclass Events

- **Masterclass Run Throughs**
- **Masterclass Training Day**
  - @ NPA-X Summer School
  - 1 week PhD School on Nuclear Astrophysics @ CERN
  - 1 day for outreach training
    - Introduction of PhD students to masterclass
    - Motivation for outreach
    - Discussion on science communication in nuclear astrophysics

Masterclass Events

- **Masterclass Run Throughs**
- **Masterclass Training Day**
- **Upcoming: ChINOS Summer School**
  - ChETEC Observational School, 24.07. - 28.07.
    @ Ondrejov Observatory, Prague

Call To Action

We are looking for:

Scientists who want to give nuclear astrophysics masterclasses

- Anyone who works in this field, can be an **Facilitator**
- **Open Access Teaching Materials** including presentation & masterclass guide

Translations

- Finishing of the translations of the first masterclass
- Translators for the second masterclass

Why you should engage here:

- Satisfy curiosity and spark **interest**
- **Inspire** the next generation of scientists, gain new talents
- **Personal benefit**: Self effectiveness as a scientist, active role in shaping society, communication training

Masterclass can be found online @

mc.chetec-infra.eu

Thank you for your attention.