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HELMHOLTZ ZENTRUM DRESDEN ROSSENDORF

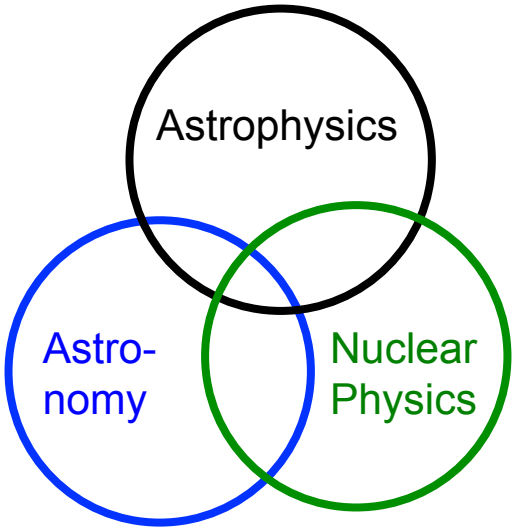
ChETEC – INFRA

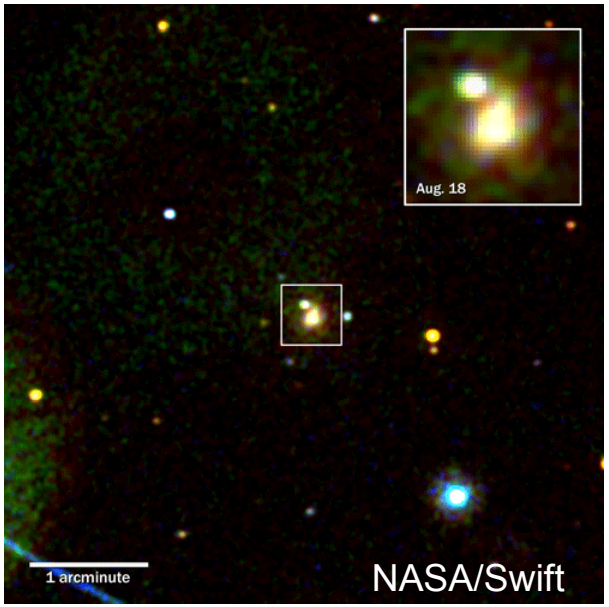
Chemical Elements as Tracers of the Evolution of the Cosmos - Infrastructures for nuclear astrophysics

Tuesday 04.05.2021, 09:40 – 10:00

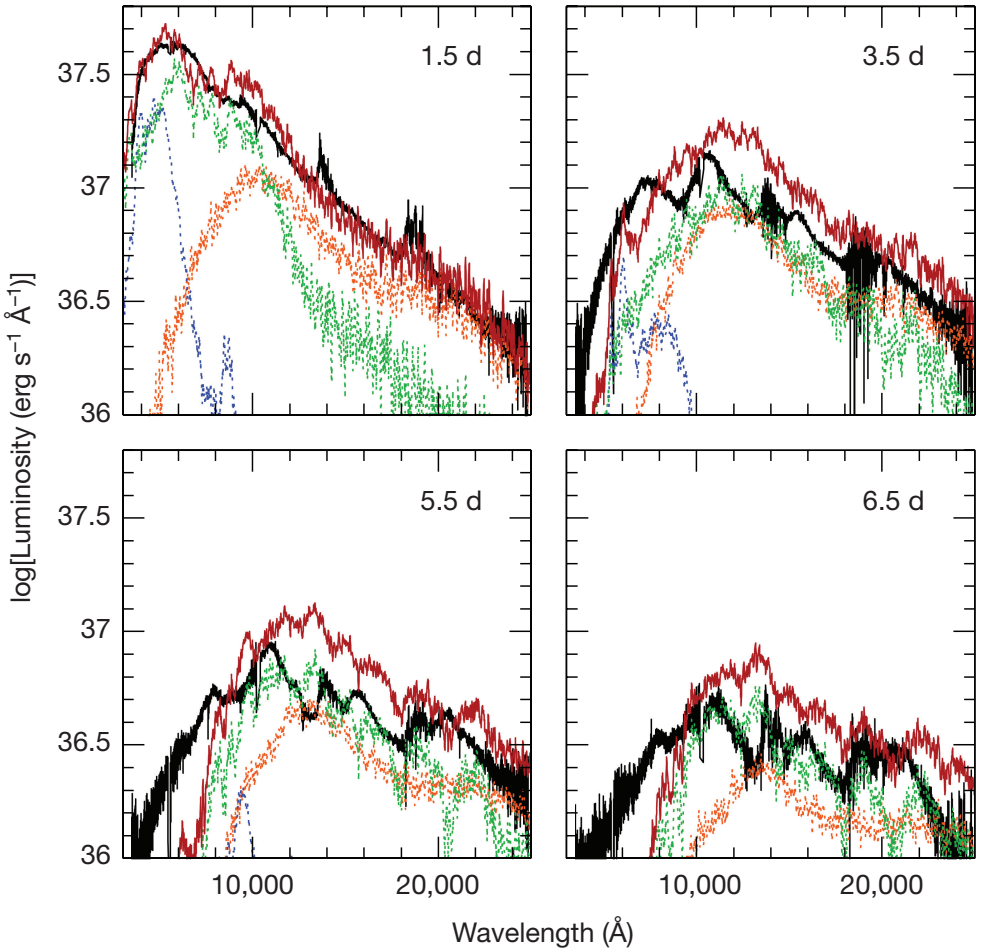
Daniel Bemmerer HZDR Dresden, DE

Nuclear astrophysics at the intersection of three disciplines

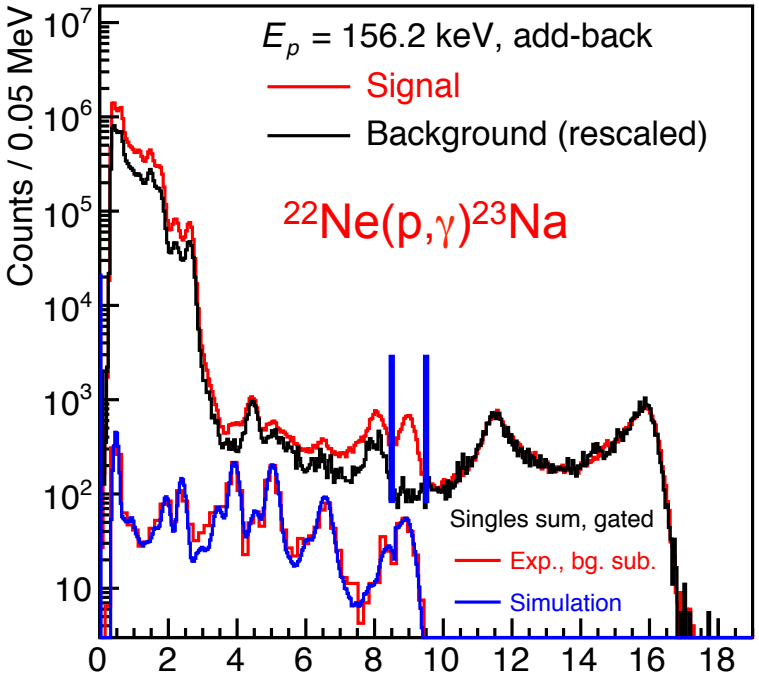




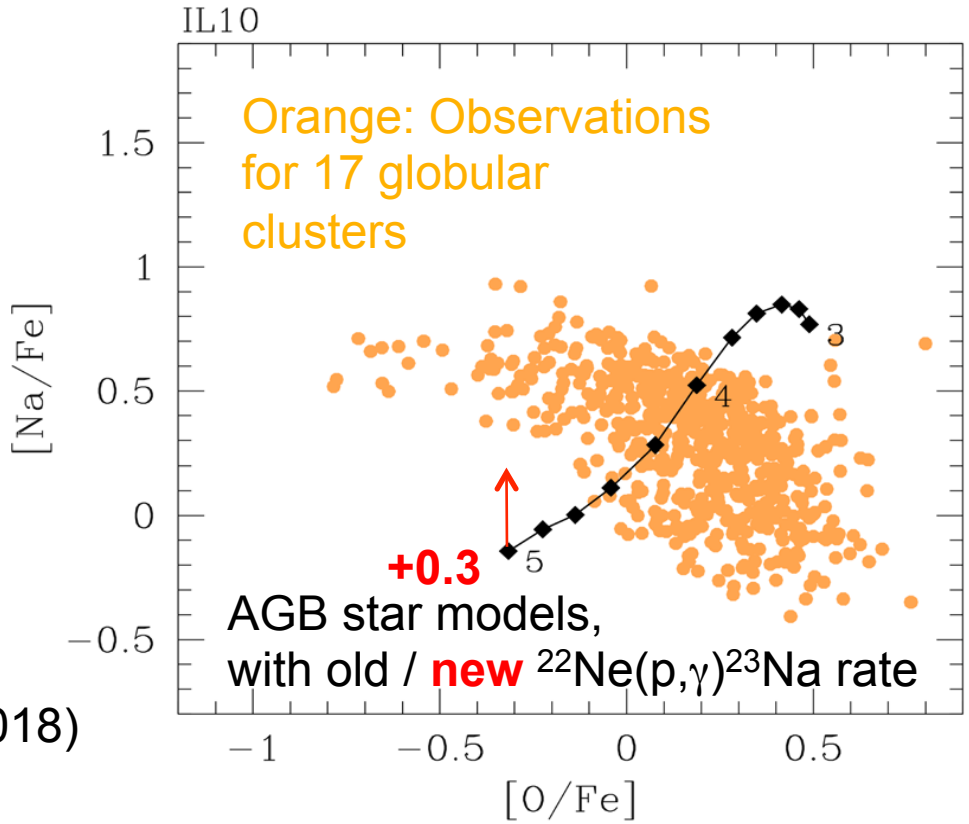
GW170817 and its kilonova
E. Pian *et al.* (2017)



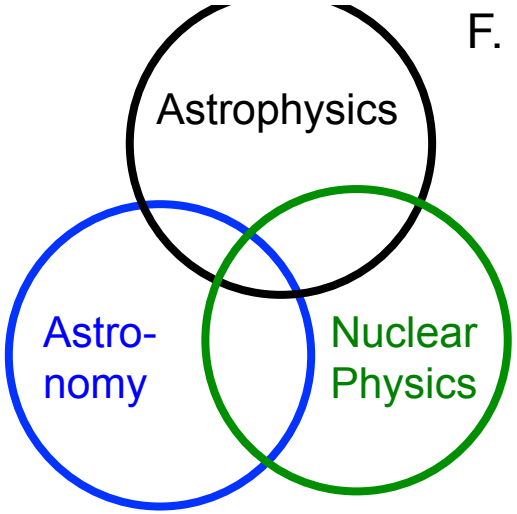
Nuclear astrophysics at the intersection of three disciplines



F. Ferraro *et al.* (2018)



A. Slemer *et al.* (2017)



Nuclear astrophysics as an emerging field in Europe

- COST Action ChETEC
  Chemical Elements as Tracers of the Evolution of the Cosmos
  30 European countries represented
  April 2017 – October 2021
  Forerunner of ChETEC-INFRA

- Nuclear Physics in Astrophysics Conference series, since 2002
  Sponsored by the Nuclear Physics Division of the European Physical Society
  200+ participants
  2019 Mainz / Germany
  next: CERN Geneva
  Partner with ChETEC-INFRA to support NPA conference schools

- Nuclei in the Cosmos conference series, every even year since 1990
  International conference alternates between Europe and non-European countries
  200+ participants
  2021 (!!) Chengdu / China

ChETEC-INFRA, an EU-supported Starting Community of Research Infrastructures for Nuclear Astrophysics

5.0 M€ EU HORIZON2020 support (2021-2025)		
TNA Transnational Access	JRA Joint Research Activities	NA Networking Activities
Infrastructure **access** • 8 nuclear labs • 4 telescopes • 1 computer	Infrastructure **usability** • Targets • Abundance corrections • Analysis pipelines	Infrastructure **networking** • Complementary Expermiments. • Solar fusion+model • Geochemistry/Astrophysics • Outreach
32 partners, 17 countries, largest EU project for nuclear astrophysics yet		

First pillar: TA Transnational Access to Research Infrastructures

8 nuclear labs: 3763 hours access

- Charged particle beams
- Neutron beams
- Underground lab
- γ-process
- Accelerator mass spectrometry

4 telescopes: 172 nights access

- NOT Nordic Optical Telescope La Palma/ES
- 3 medium-sized telescopes in BG, CZ, LT

1 supercomputer: 8 million cpu hours access

- Hull/UK viper cluster

Any scientist from EU+associated countries may apply with their experiment / observation / computation ideas, no need to be member of ChETEC-INFRA!

Detailed information, including presentations of all facilities, today in the 11:30-13:00 and 14:00-15:30 sessions.

Second pillar: JRA Joint Research Activities

JRA1 Astronuclear Lab

- Targets
- Detectors
- Accelerator Mass Spectrometry

JRA2 Astronuclear HPC (high power computing)

- Tools for Access to HPC
- Software Pipeline
- Nucleosynthesis Codes

JRA3 Astronuclear Abundances

- Database of Abundance Corrections
- Open-Source Stellar Pipeline

Any scientist may join and contribute!

Breakout sessions tomorrow 09:30 – 11:00.

Presentation of the JRAs to the plenum tomorrow, in the 11:30-12:45 session.

Third pillar: NA Networking Activities

NA1 Comprehensive Nuclear Astrophysics

- Cross-collaboration
- Galactic chemical evolution

NA2 Dissemination, Outreach, Innovation

- Masterclasses and Scientific Schools
- Conference Outreach, Research-Industry Days

NA3 Astronuclear Library

- “Big Three” and solar fusion
- Rate library, data, and metadata format

NA4 Mass Spectrometry Network

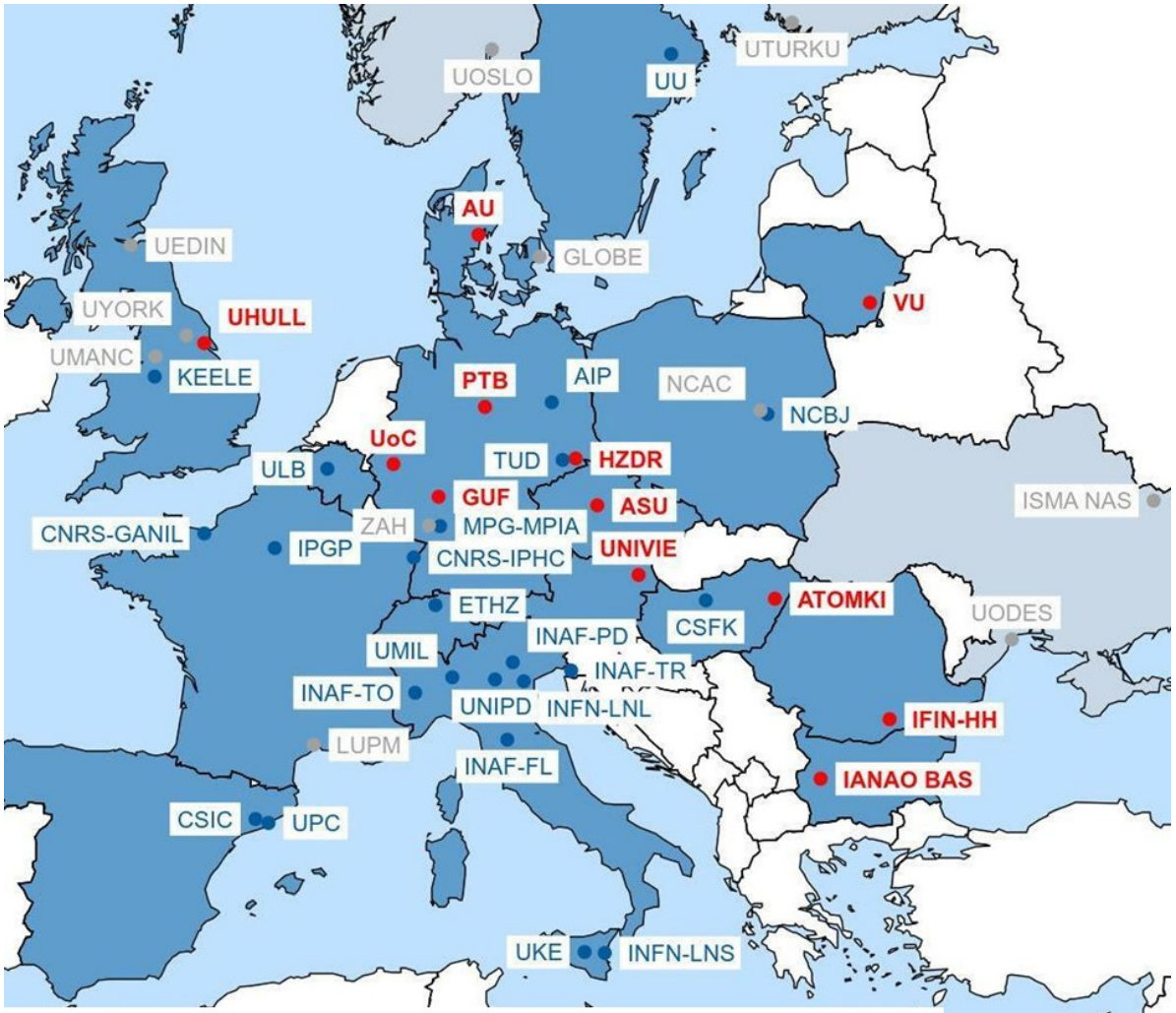
- Bridge to planetary science

Networking results and tools will be made available on the web, for all scientists.

Breakout sessions tomorrow 09:30 – 11:00.

Presentation of the NAs to the plenum tomorrow, in the 13:45-15:30 session.

ChETEC-INFRA, 32 partners in 17 countries



- **ChETEC-INFRA partners with TA infrastructures**
- ChETEC-INFRA other funded partners
- ChETEC-INFRA associated partners

Cross-cutting goals

Educate the next generation of scientists

- Start with high school students
- SNAQs for PhD students already started !, reach+activate several 100 partipants

Increase participation across Europe+, across genders, nationalities, …

- Conference outreach, web page, …
- Top-level Gender and Inclusiveness Coordinator

Synergies and coherence with neighboring communities

- Large telescopes, labs, and supercomputers
- Links between astro and planetary sciences
- Links to US IRENA, China, Japan, …
- Links to COST actions **ChETEC**, GAIA-MW, PHAROS, ...

Interdisciplinary approaches

- TNA proposals using more than one type of infrastructure are encouraged
- Education of one PhD student in all three disciplines (observation, nuclear, astro)

ChETEC-INFRA, takeaway messages

Basic facts

- 32 partners in 17 EU+ countries
- ChETEC-INFRA runs 01 May 2021 – 30 April 2025
- 5.0 M€ support from EU research infrastructure networking budget
- We are a **starting** community, meaning we are meant to **learn**

What does it already mean for you?

- Network of research infrastructures to **serve** nuclear astrophysics
- ChETEC-INFRA access to research infrastructures is **open to all** scientists in EU+ countries, selection based on scientific merit

Structure of this kick-off meeting

Session	Topic
Tue 09:30-11:00	Welcome, COST actions, role model infrastructure networks, etc.
Tue 11:00	**Conference photo**
Tue 11:30-13:00	Transnational access (1)
Tue 14:00-15:30	Transnational access (2)
Tue 16:00-17:30	Closed session of General Assembly, votes (1 member per partner)
Wed 09:30-11:00	Breakout sessions for JRA and NA work packages
Wed 11:30-12:45	Presentations of JRA work packages
Wed 13:45-15:30	Presentations of NA work packages
Wed 16:00-17:30	International partners, and practical questions