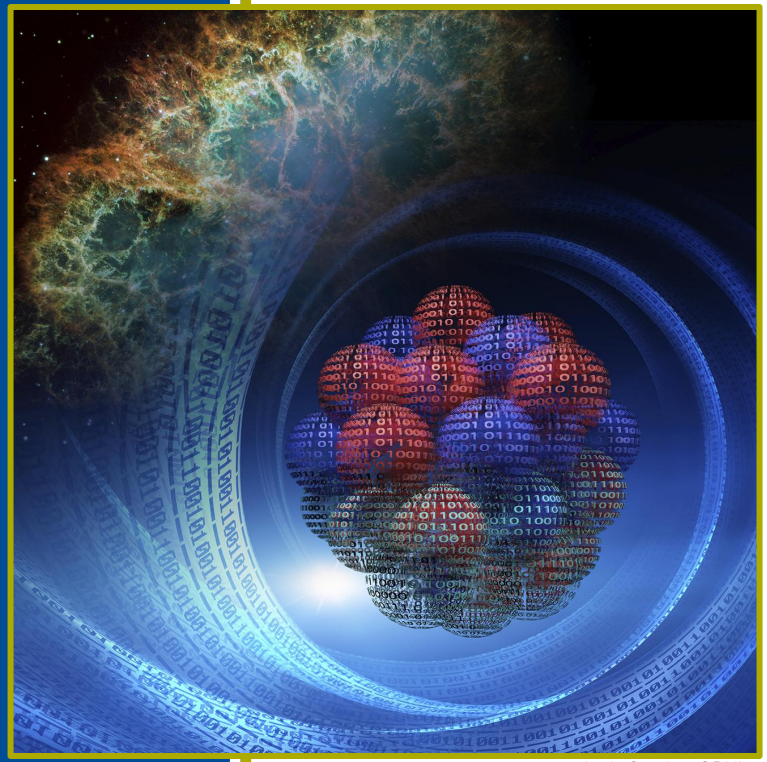
WOUTER RYSSENS



Andy Sproles, ORNL

Nuclear astrophysics at ULB: topics and PhD opportunities

W. Ryssens, N. Chamel and S. Goriely

wryssens.com

wryssens@ulb.be

BLU ULB BRUSSELS LABORATORY OF THE UNIVERSE

ULB

fnrs LA LIBERTÉ DE CHERCHER

Institut d'Astronomie et d'Astrophysique @ ULB

Composition

- 7 permanent staff
- 8 PhD students
- 12 postdocs

...from all over the world!

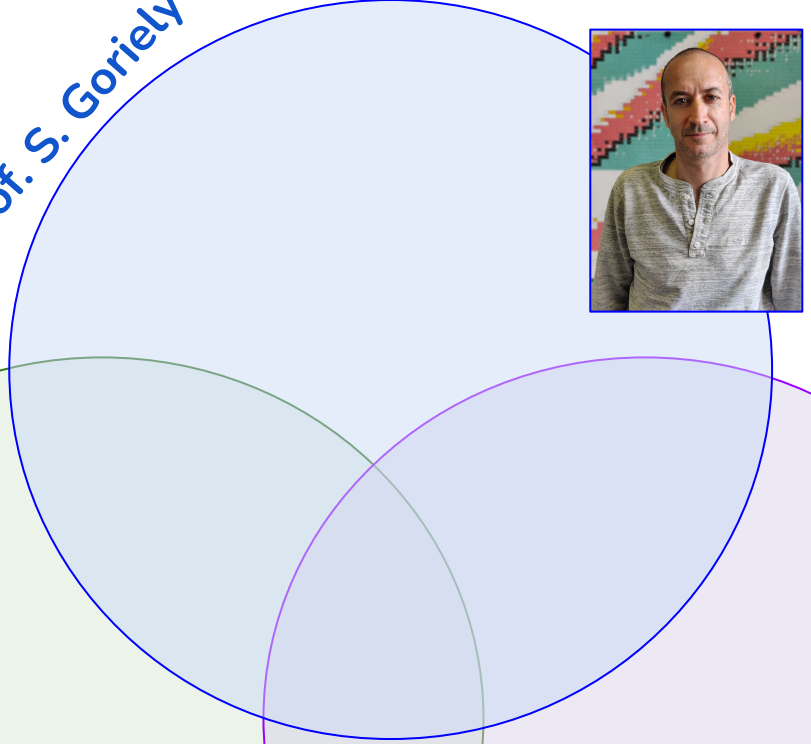
Research interests

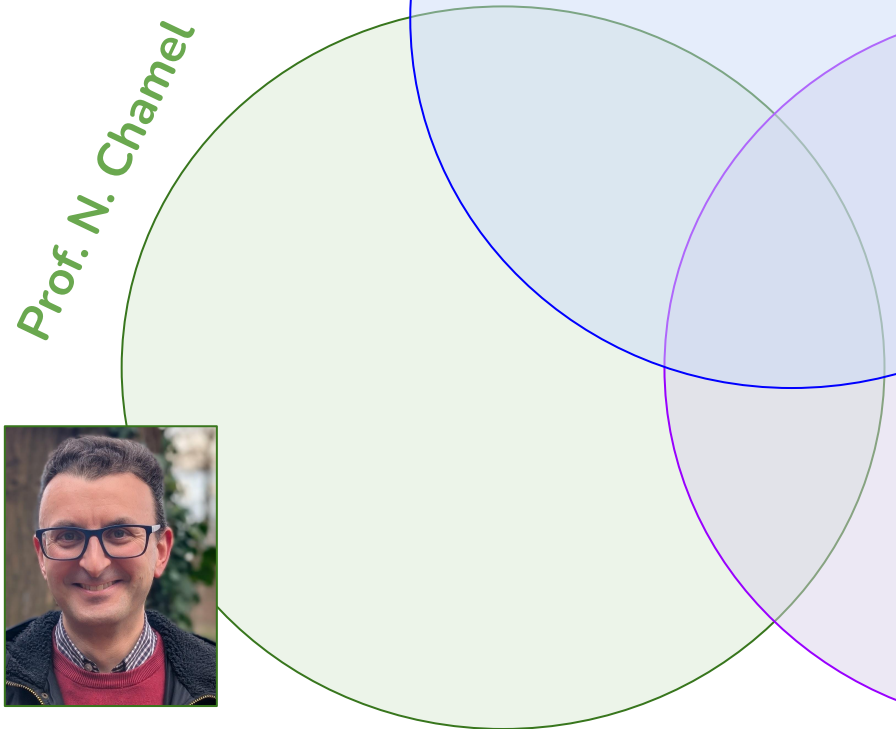
- Stellar evolution and hydrodynamics
- Chemical composition
- Binary systems
- Spectroscopy: earth- and space-based
- Compact stars
- Nucleosynthesis
- Nuclear structure and reactions in hot dense plasmas

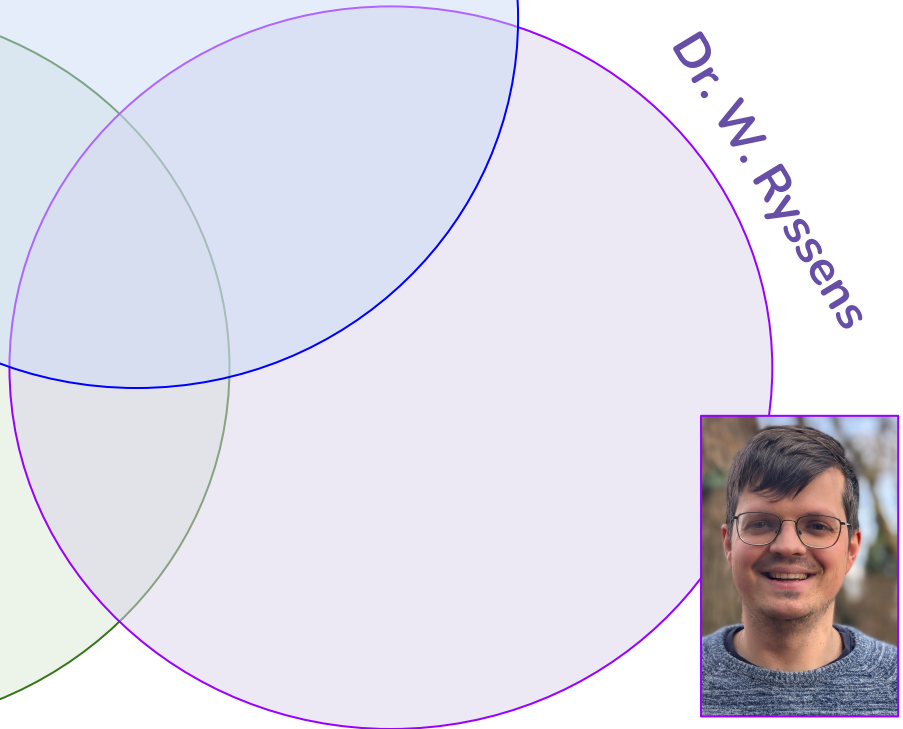




Nuclear astrophysics @ IAA



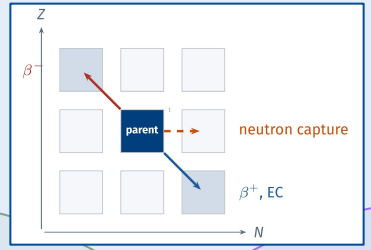




Nuclear astrophysics @ IAA

Prof. S. Goriely

Nucleosynthesis
and nuclear reactions





Prof. N. Chamel



Dr. W. Ryssens



Nuclear astrophysics @ IAA

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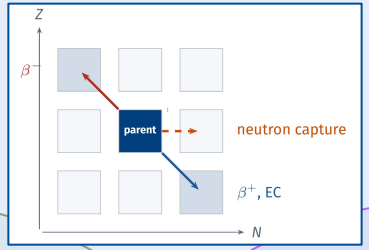
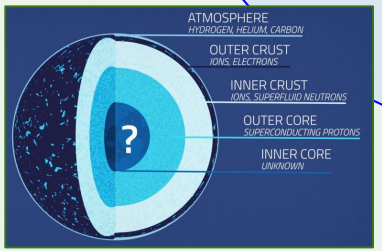


Prof. N. Chamel





Neutron stars
structure and evolution

Dr. W. Ryssens



Nuclear astrophysics @ IAA

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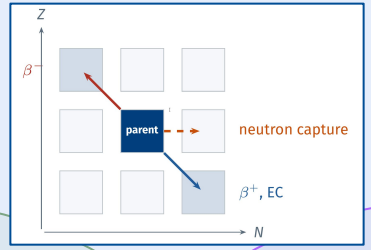
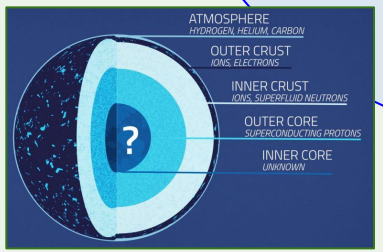
Nucleosynthesis
and nuclear reactions





Prof. N. Chamel





Neutron stars
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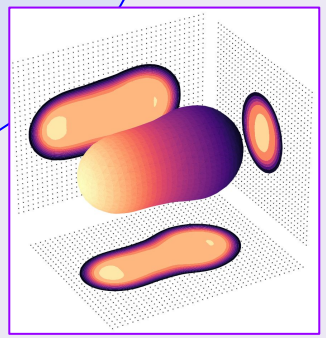


Nuclear structure
microscopic modelling and HPC

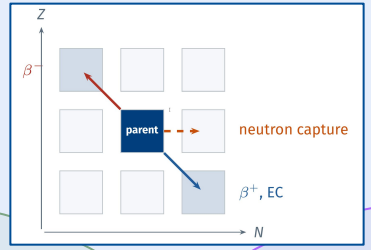


Nuclear astrophysics @ IAA

Prof. S. Goriely

Nucleosynthesis
and nuclear reactions



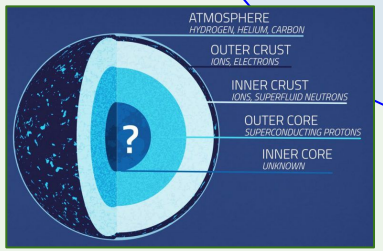


Prof. N. Chamel

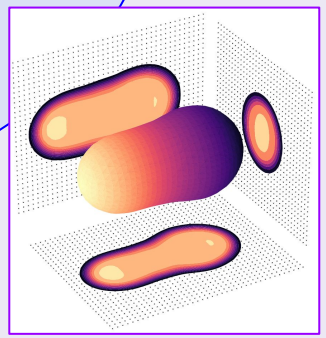
Equation of state

Nuclear data

Dr. W. Ryssens



Pasta phases





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structure and evolution

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microscopic modelling and HPC



Nuclear astrophysics @ IAA

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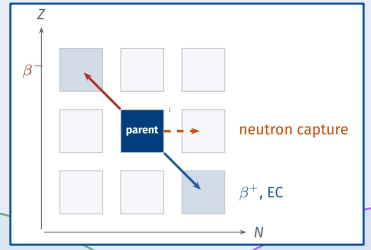
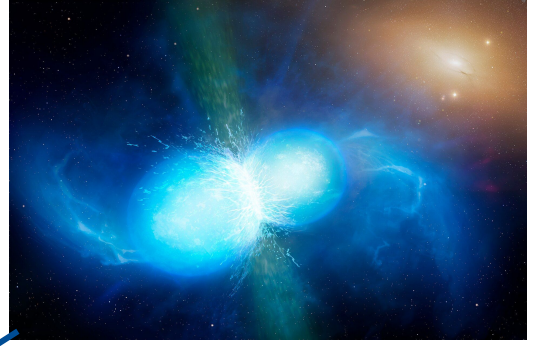
Nucleosynthesis
and nuclear reactions



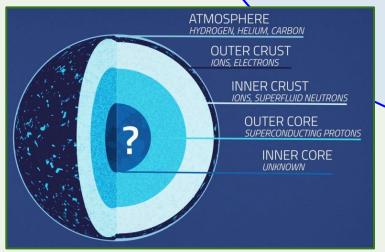




Equation of state

Nuclear data

Prof. N. Chamel

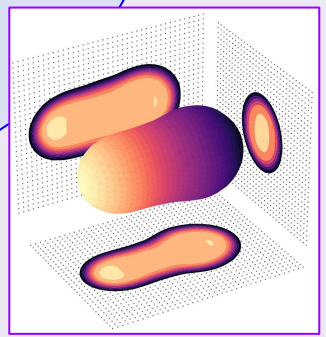




Neutron stars
structure and evolution

Pasta phases

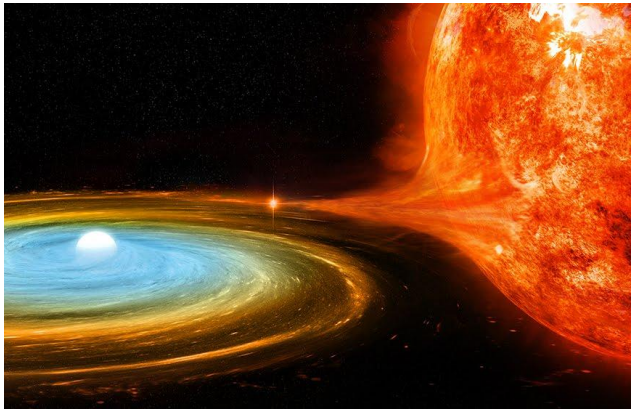
Dr. W. Ryssens



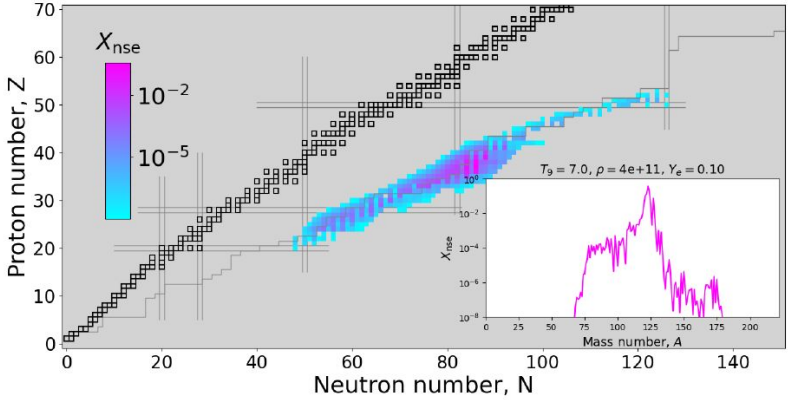
Nuclear structure
microscopic modelling and HPC



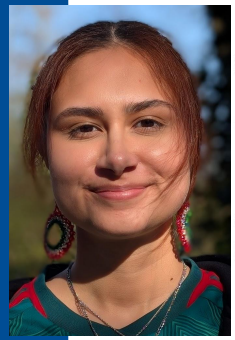
A selection of current topics: **r-process**

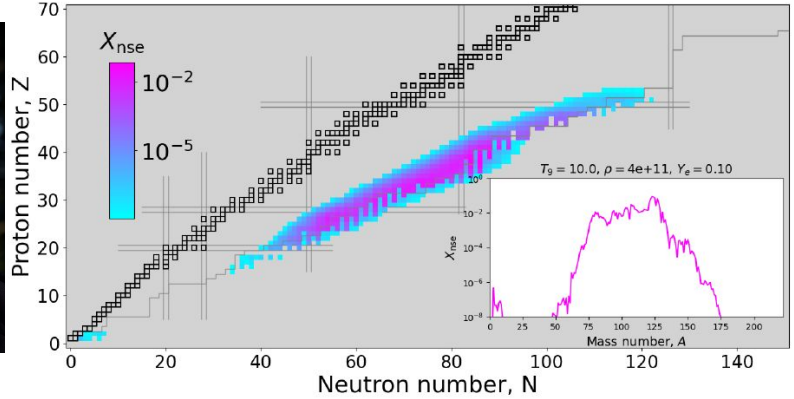


r-process in collapsing white dwarves - Natalia

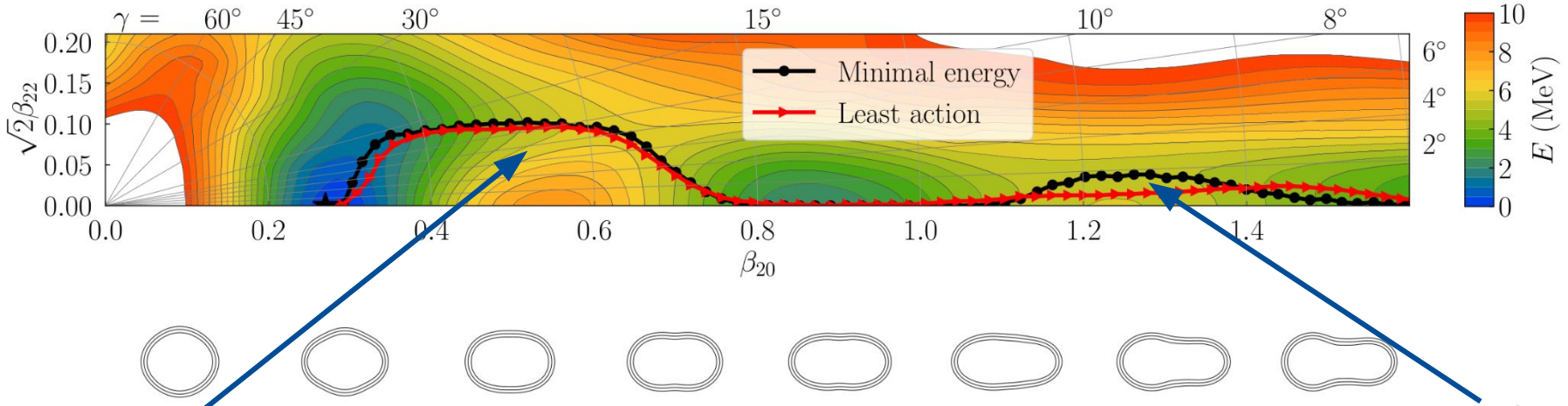


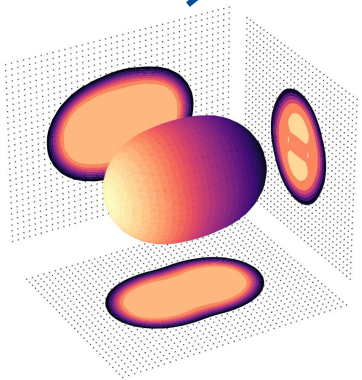
- accretion can induce the collapse of white dwarfs
- can this mechanism generate r-process nucleosynthesis?
- synthesis of nuclear, atomic and hydrodynamic input

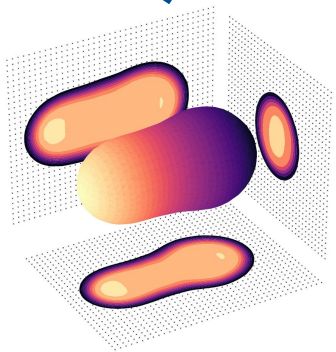




A selection of current topics: **fission**





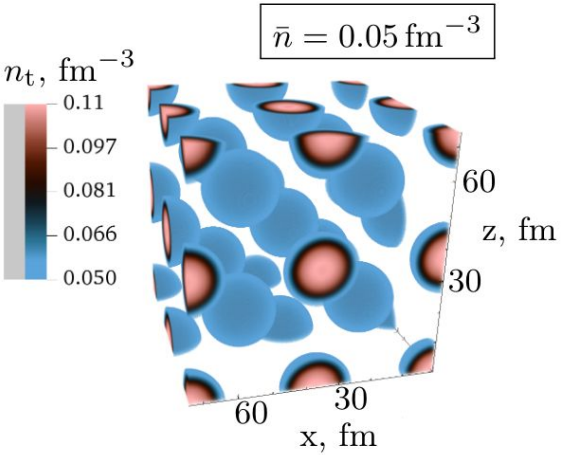


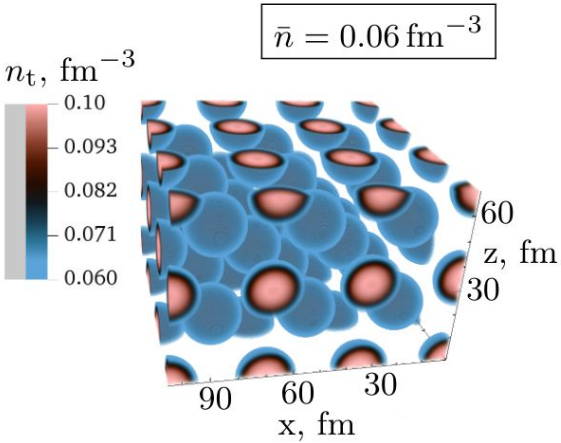
Fission modelling - Adrián

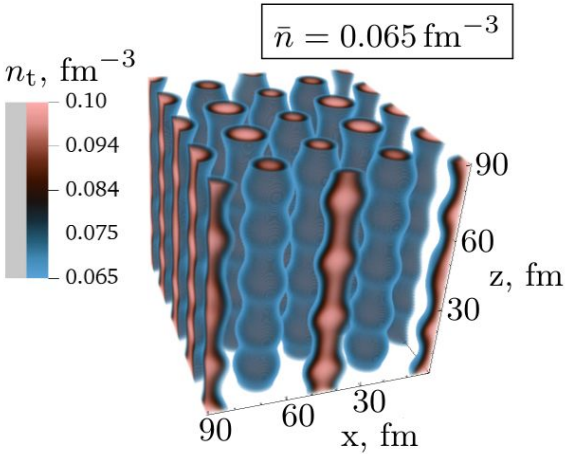
- out-of-equilibrium large-amplitude collective motion with tunneling
- little experimental data
- yet **critical** to stop the r-process!



A selection of current topics: **nuclear pasta**







Nuclear pasta - Nikolai

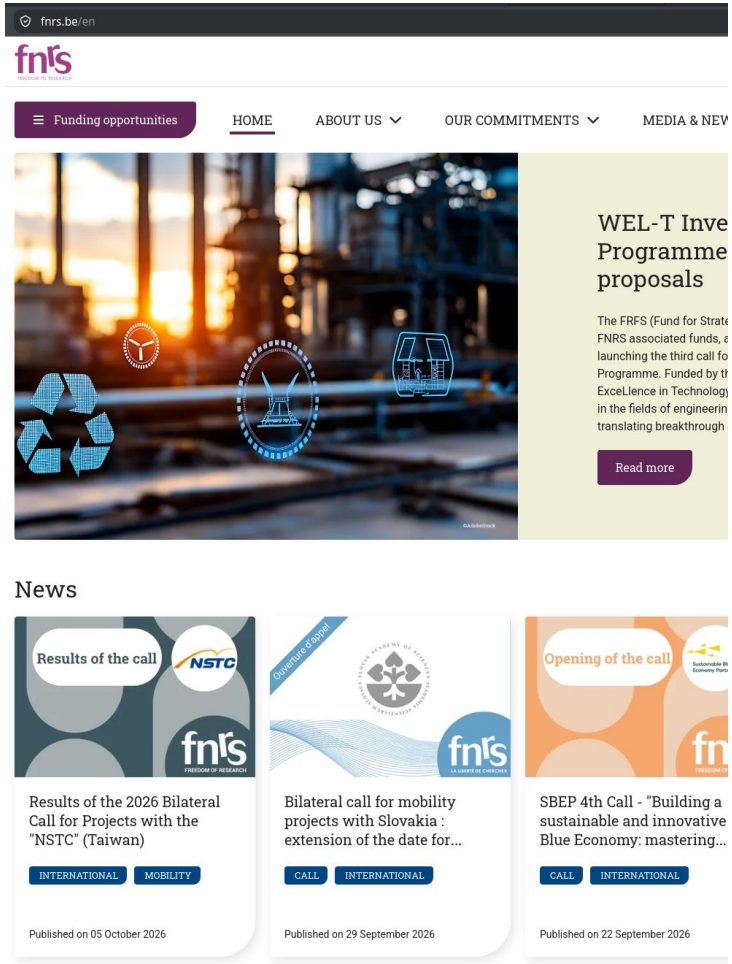


- crystalized dense matter
- expected in neutron star mantle and should impact observations
- ~10^9 CPUh - HPC at extreme scale



Doing a PhD in Belgium

- Typical starting date: 01/10
- Duration = 4 years
- Competitive salary: ~35 k€ / year before taxes
- PI-level funding
  a. www.euraxess.ec.europa.eu
  b. nothing at the moment :(
- Personal grants -> www.fnrs.be
  a. “Bourses & Mandats”
     Opens DECEMBER
     Closes **February**
  b. “FRIA” call
     Opens **JULY**
     Closes **August**



Conclusion

We study **dense matter in the universe**
based on **microscopic** modelling.

Questions on PhDs, master projects, life at IAA ?

Contact us!

- sgoriely[at]ulb[dot]be - nucleosynthesis
- nchamel[at]ulb[dot]be - neutron stars
- wryssens[at]ulb[dot]be - nuclear structure

