

**UK Nuclear Physics  
Community Meeting  
London, 10-11 January 2023**

**Jacek Dobaczewski**

**Based on the Robert Page's  
NPAP report to the Science Board**

**12 October 2022**

# Outline of presentation

- NPAP membership update
- NPAP activity
- Overview of UK Nuclear Physics Community
- Highlights & Plans → Nuclear Physics Forum
- Developing STFC nuclear physics priorities
- Consolidated Grants & Concerns
- Nuclear Physics Roadmap 2023
- Conclusion

# Members of NPAP

Jacek Dobaczewski (chair)	University of York
Rachel Montgomery	University of Glasgow
Philippos Papadakis	STFC
Pascal Reiter	University of Edinburgh
David Sharp	University of Manchester
Paul Stevenson	University of Surrey

## Public web page:

<https://www.ukri.org/about-us/stfc/how-we-are-governed/advisory-boards/nuclear-physics-advisory-panel/>

# NPAP Activity

- UK Community meeting 18<sup>th</sup> – 19<sup>th</sup> January 2022
- Nuclear Physics European Collaboration Committee (NuPECC) Long Range Plan input
- Infrastructure Fund Wave 3 – DATUM
- Minor update to projects Roadmap
- Input to EPSRC Nuclear Academics
- Upcoming:
  - Nuclear Physics Strategy update

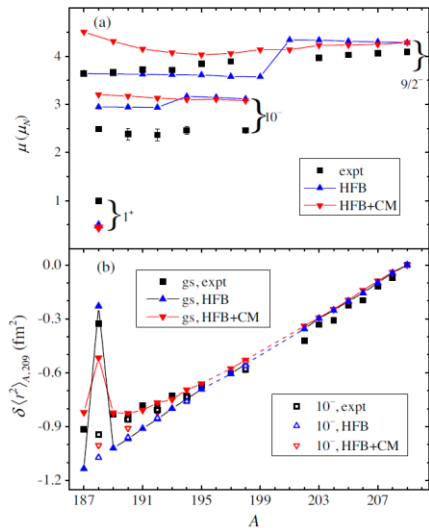


# UK nuclear-physics community

- There are ~70 academic/faculty staff @ 12 institutions carrying out nuclear physics research
  - Number has been growing with recent new appointments
  - All (except 4 at STFC Daresbury) are University funded
- There are ~60 Research and Professional staff supporting the academic staff
- There are ~90 Research students working with the academic staff
- Approximately 48 funded by STFC

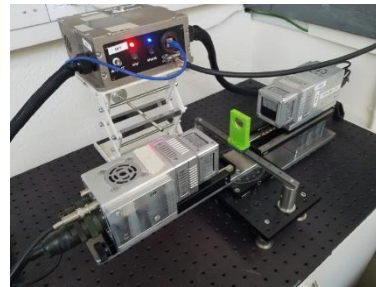
**Action: February 2023**

# Some core programme highlights

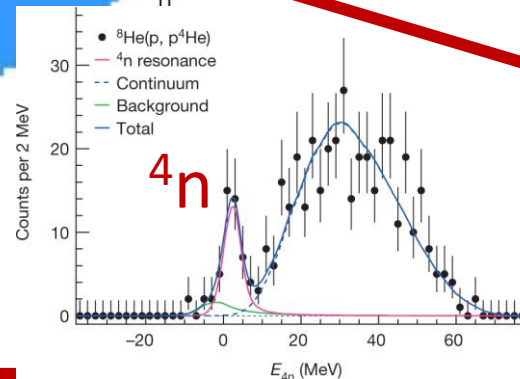
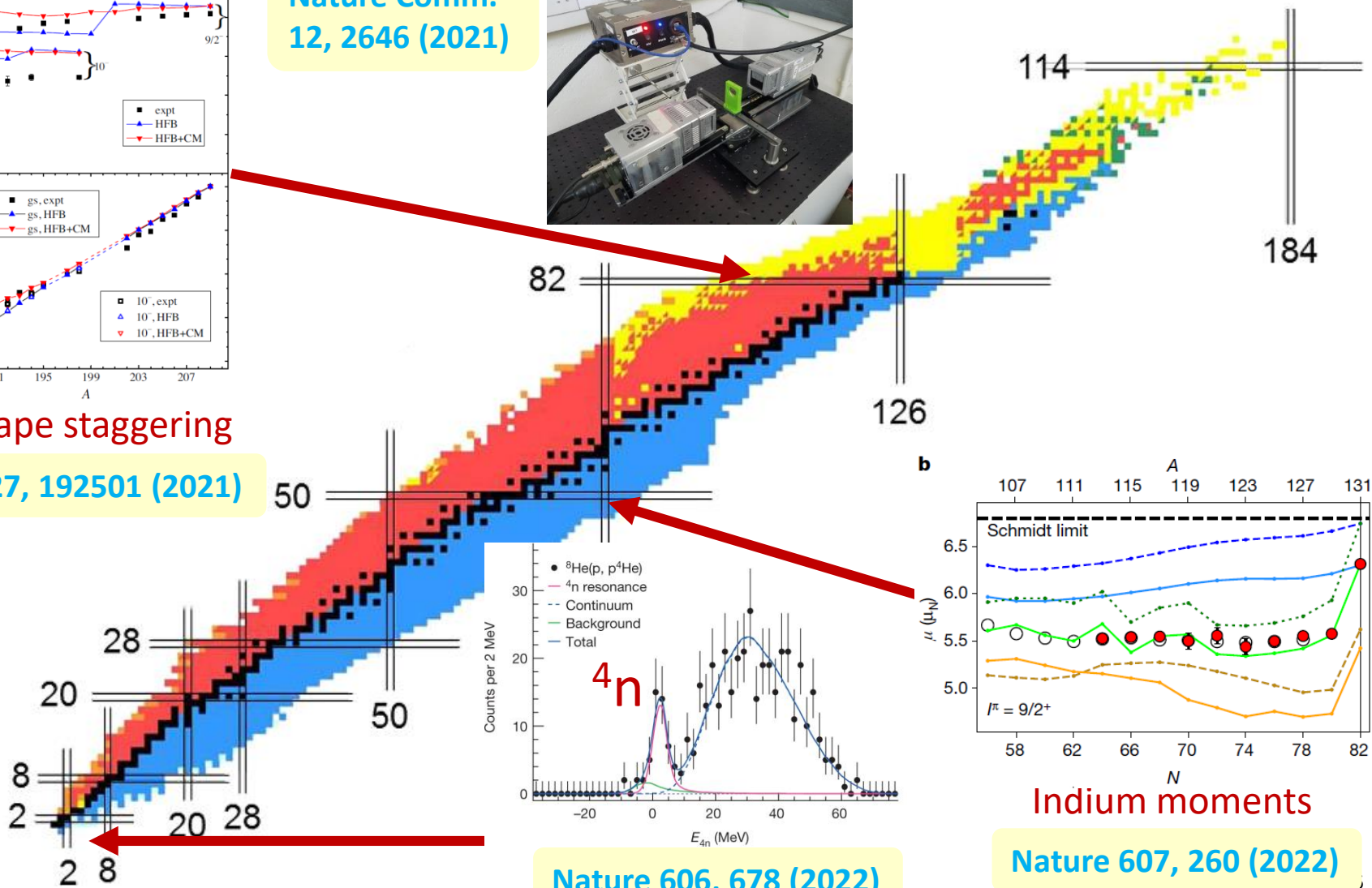


Nature Comm.  
12, 2646 (2021)

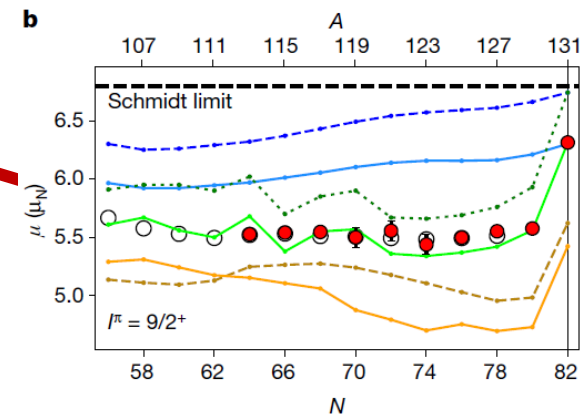
PET entanglement



Bi Shape staggering  
PRL 127, 192501 (2021)



Nature 606, 678 (2022)



Indium moments

Nature 607, 260 (2022)

# Developing STFC nuclear physics priorities

Many high-quality applications submitted, 4 grants funded, not just a one-off?

“ This grant will help us achieve a UK facility aimed at **understanding** neutron-capture **processes** that forge the elements in large stars. ”

-Dr Carl Wheldon, University of Birmingham



“ The proposal aims to open a new research programme to **challenge** the main paradigms of the theory of **fission**. It proposes to build a fundamental piece of computational **infrastructure** required for the advanced studies of fission. ”

-Dr Jacek Dobaczewski, University of York



“ The **DEMAND** project aims to develop new detector **technology** that will allow us to perform direct **measurements** of astrophysical reactions involving neutrons. ”

-Dr Gavin Lotay, University of Surrey



“ With this grant we will **develop** novel materials for studying reactions with exotic nuclei, to **understand** how stars explode and the elements they create. ”

-Dr Alison Laird, University of York



# Consolidated Grants

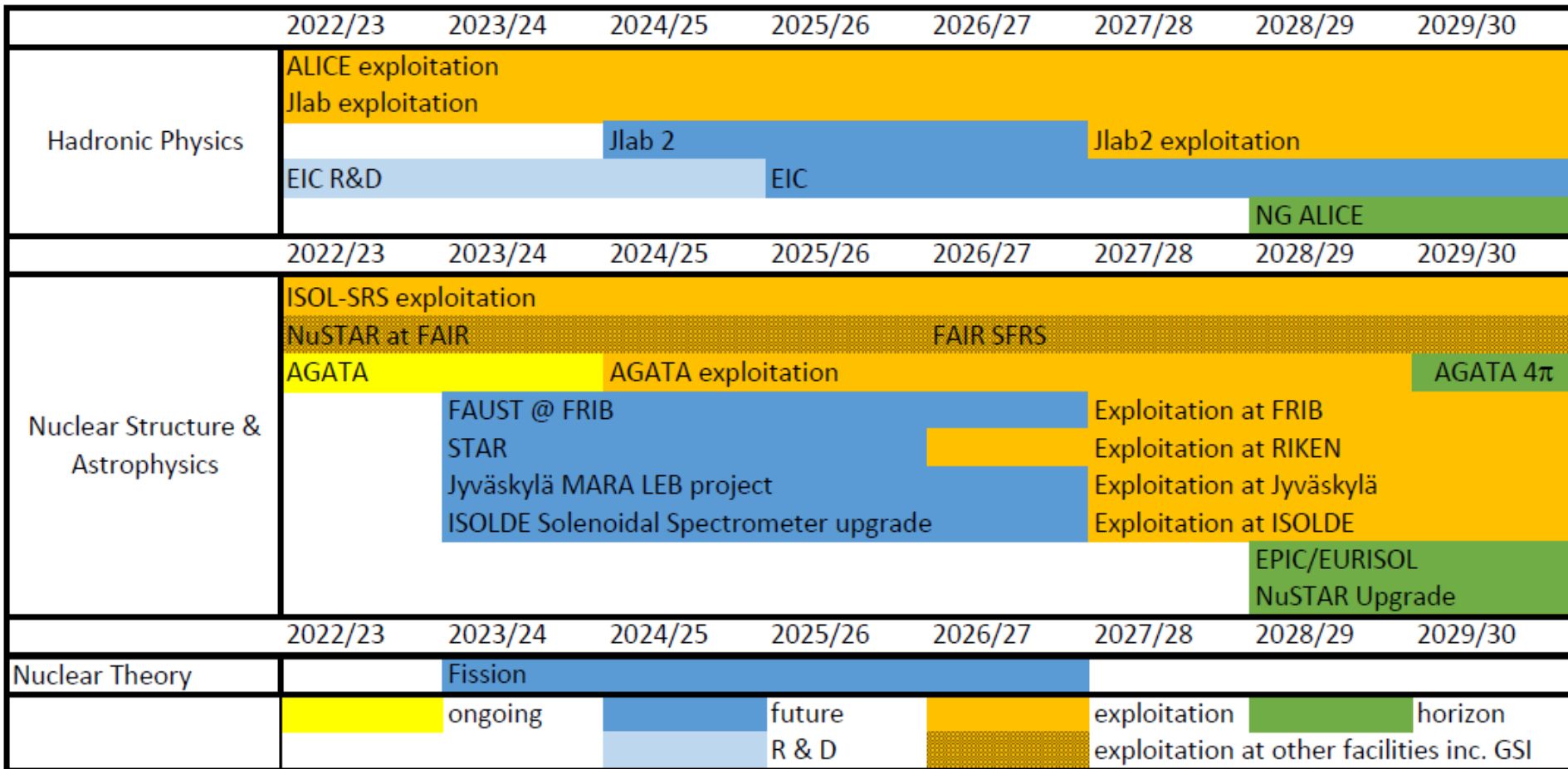
- Deadline 7<sup>th</sup> February 2023
- Widespread concern about further cuts
- Inflation, exchange rates, salary costs, ...

## Other concerns

- BREXIT
- Horizon 2020?
- Energy costs closing labs
- UKRI Open Access policy & APS journals for NP



# Roadmap for existing projects and future opportunities



# Theory challenges & opportunities

## Departures

- Arnau Rios Huguet University of Surrey
- Carlo Barbieri University of Surrey
- Alessandro Pastore University of York

## Arrivals

- Esra Yuksel University of Surrey
- Matteo Vorabbi University of Surrey
- (...) University of York

## Near-term

- ~~Neutrino-nucleus interactions~~
- Fission

## Embryonic

- Quantum-computer simulations for nuclear systems

# Nuclear Physics Roadmap 2023

## Guidance for PPAN Community Roadmaps



Science and  
Technology  
Facilities Council

- Achievements/scientific discoveries since the last roadmap
- Key science questions which are priorities to address
- International context, international roadmaps, and strategies or strategic reviews
- Overview of the science areas including highlighting any complementary science/research fields or areas of overlap with programme areas
- Capabilities/ Facilities used to answer the science questions or per science area, including access arrangements
- UK leadership, involvement, current projects (STFC supported and non-supported) and future opportunities in each science area
- Current and future (short and long-term) infrastructure requirements and opportunities, with an idea of any specific drivers for these requirements (leadership, time, scale of investment etc)
- Underpinning technologies, capabilities and other cross cutting areas (including e-infrastructure/digital infrastructure)
- Science impact and community standing/performance
- Applications, innovation or industrial engagement
- Outreach, Engagement, Training and Education
- Proposed roadmap Gantt chart (example below), feasibility of enabling the roadmap and any indication of prioritisation or advantages/disadvantages of the options.

**Action: February – May 2023**

# Concluding Remarks

- UK Nuclear Physics: small but **vibrant** community
- Play an important role in many **international** projects
- Recognized international **leadership** and **expertise**
- Productive collaboration with **industry**
- Strong **professional development** and training programmes

# UK Nuclear Physics

## NPAP update

### January 2023

