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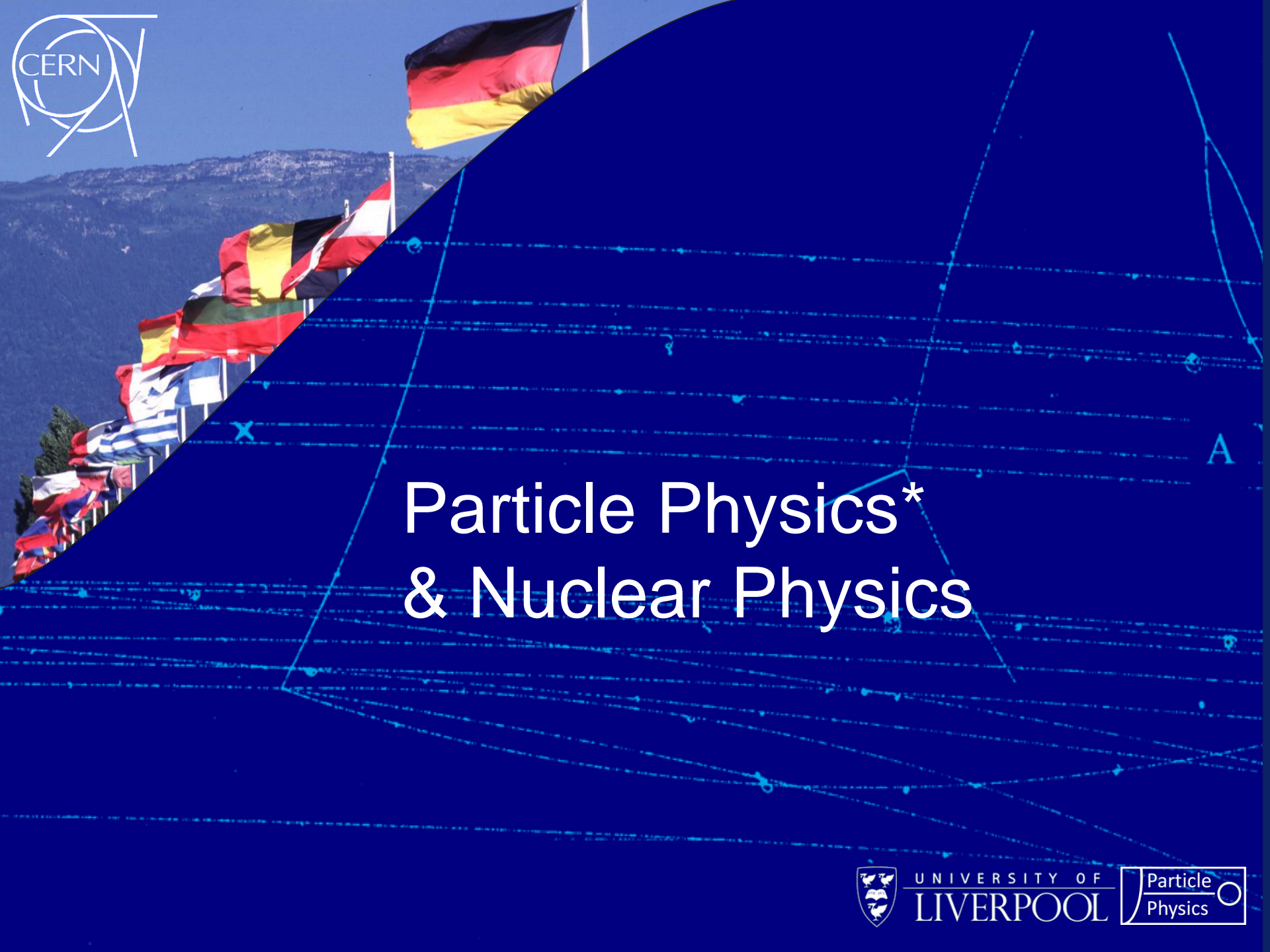
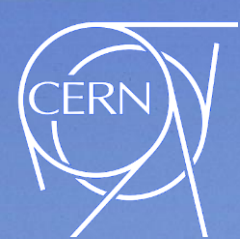
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LIVERPOOL

A member of the Russell Group



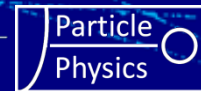
Science & Technology  
Facilities Council



# Particle Physics\* & Nuclear Physics



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# About the PP Group

- 16 Academics & Fellows
- 7 Visiting Profs *including 1 Nobel Laureate*
- 25 Researchers and Engineers
- 8 High Skilled Technical Staff
- 20 PhD Students

Host UK (and Europe's) premier facility for construction of detectors for Particle Physics

**Liverpool Semiconductor Detector Centre (LSDC) and Detector Fabrication Facility**

About 70% of our activity at CERN



# Particle Physics Drivers & Strategy

To answer the most important questions in fundamental physics

- Study of the Higgs (H)
- Understand mass generation of neutrinos and CP violation in the neutrino sector ( $\nu$ )
- Baryon asymmetry (matter-antimatter dominance - CP)
- Non-luminous energy and matter (DE,DM)
- Look for hints of new physics beyond Standard Model (BSM)

In line with national and international priorities

- Keep Liverpool “at the front of the pack”
- A balanced strategy of high discovery potential v guaranteed measurements
- Ensure we do R&D that supports physics

# Nuclear Physics

## Complementary Interests

- Structure of Nuclei
- Properties of Matter at Early Stage in the Universe
- Antimatter

ISOLDE  
ALICE  
ALPHA

At CERN, approx. 5 academics.

Use the LSDC and Detector Fabrication Facility



# Current Activity at CERN

Experiment	Physics Activity	Academics	STFC/year (£M)	Capital/Total (£M)
ATLAS <sup>+upgrade</sup>	Higgs, BSM	Allport, Burdin, D'Onofrio, Klein, M, Klein, U, Kretschmar, Mehta, Vosselbeld	2.0	10/500
LHCb <sup>+upgrade</sup>	BSM, CP	Bowcock, Hutchcroft, Shears	0.7	1/40
NA62	BSM	Dainton, Fry, Hutchcroft	0.0 (ERC)	0.5/20
RD50	Si R&D	Casse*	0.3	~5% annual
ALICE <sup>+upgrade</sup>	New states matter	Chartier, Dainton	0.5*	0.5*/50
ISOLDE/ISOL-SRC	Nuclei	Butler, Joss, Page	0.1	1.3/20
ALPHA	Anti-H	Joss, Nolan, Boston	0.1	2.7/

*Data taking*  
*In preparation*

*\*under review*

# Funding Profile

£4M/year Consolidated Grant(s)

£3M/year “responsive” inc. STFC, EPSRC, RS, AWE, DSTL, ERC

(Sustained over last 30 years)

Display by: **INSTITUTION** | REGION | PERSON | KEYWORDS |

| Home > Funding > What we've Funded > Grants on the web

### Support by Institution

Sort by: UK £ Value  ascending  descending

Organisation	Web Site	Number	UK £ Value
Imperial College London	<a href="#">www</a>	40	36,273,478
University College London	<a href="#">www</a>	51	35,178,509
<b>University of Liverpool</b>	<a href="#">www</a>	<b>31</b>	<b>33,933,845</b>
University of Cambridge	<a href="#">www</a>	39	33,463,657
University of Oxford	<a href="#">www</a>	46	31,488,948
Durham University	<a href="#">www</a>	22	24,351,591
The University of Manchester	<a href="#">www</a>	38	19,995,848
University of Edinburgh	<a href="#">www</a>	28	17,566,220
University of Glasgow	<a href="#">www</a>	27	17,271,529
University of Leicester	<a href="#">www</a>	31	16,357,558
University of Birmingham	<a href="#">www</a>	21	12,409,514
Queen Mary, University of London	<a href="#">www</a>	12	8,463,617
University of Sheffield	<a href="#">www</a>	28	8,285,500
University of Bristol	<a href="#">www</a>	11	6,732,526
Cardiff University	<a href="#">www</a>	14	6,591,742
Open University	<a href="#">www</a>	29	6,228,431
Royal Holloway, Univ of London	<a href="#">www</a>	13	5,958,149
University of Surrey	<a href="#">www</a>	12	5,812,317
University of Sussex	<a href="#">www</a>	12	5,411,296
Lancaster University	<a href="#">www</a>	9	4,995,934
University of Southampton	<a href="#">www</a>	14	4,990,456
University of Leeds	<a href="#">www</a>	10	4,691,590
University of St Andrews	<a href="#">www</a>	15	4,456,750
University of Warwick	<a href="#">www</a>	10	3,996,410
University of Exeter	<a href="#">www</a>	8	3,075,034

*Includes Cockcroft*



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# New Initiatives

- **Next generation of physics experiments and accelerator 2035 +**
  - **Adapt to new input of Asian funding**
    - Initiatives in far east (HK). Expansion
  - **“Local” expansion and increase of links with CERN**
    - Exploitation of engineering links to benefit other Departments
      - STFC/EPSRC opportunities for increased revenue to Liverpool
    - Studentship Scheme (2014/...) 5 students shared with CERN
  - Strengthening of links with CERN via DL/Cockcroft
    - Business Park
  - **ATLAB**
    - Exploitation of technologies
  - **Quantum Technologies** (With EEE) (DE/DM)
  - **Sensor City** (L'pool)
  - Benefiting from **IPS Fellowship**



# Current Applications

We have strengthened our programme of applications (security sector, homeland defence, nuclear decommissioning addition to traditional health sector)

“want real commercial output and not simply more Ponzi style grants

- MODES (trials and commercial with company)
- ARMS Reactor Monitoring (pre-trial at Wylfa and the IEAE now with SME involvement)
- PCT Wellcome Foundation
- Neutron Detectors (Intention to commercialize)

International Festival Of Business

# SUMMARY

University has invested deeply  
in Particle Physics

- unique resources
- strong track record

Broad Programme

Physics

Engineering

Training & inspiring next  
generation of scientists

Proud of what Liverpool has  
contributed, for over 100 years,  
to the fundamental  
understanding of our Universe.

