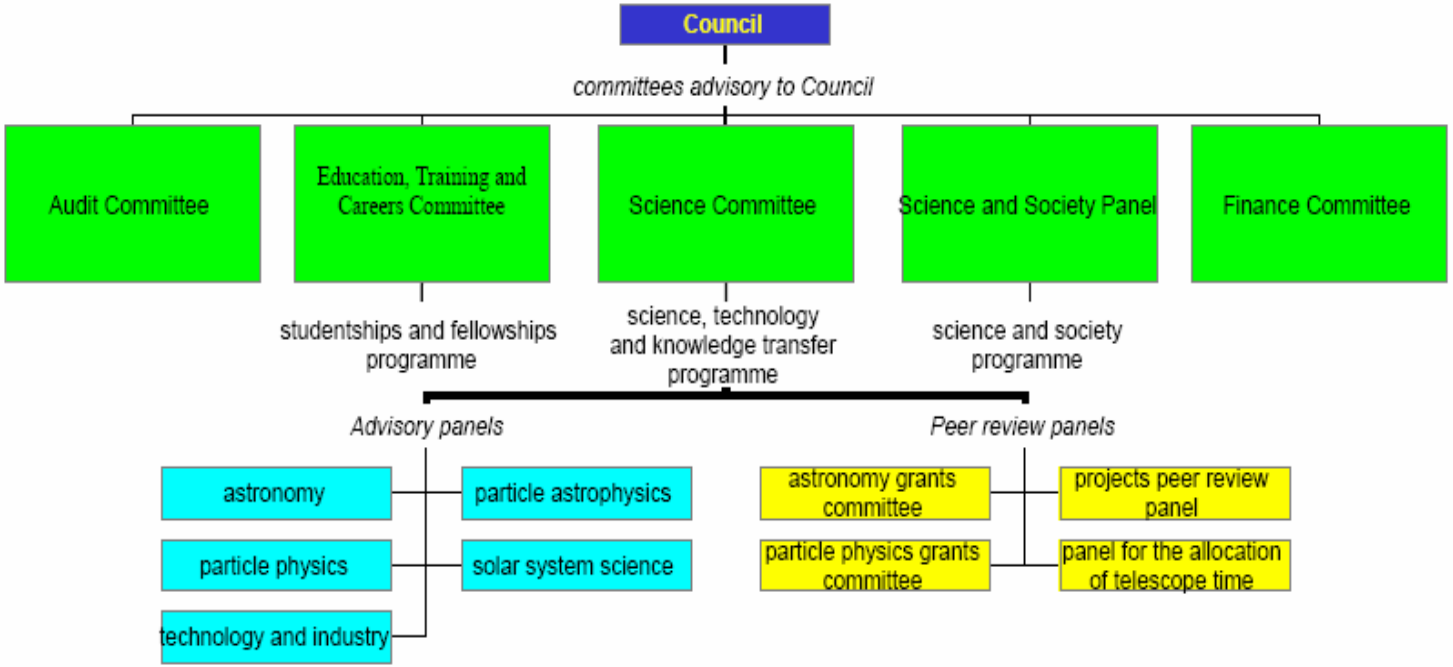
The Particle Astrophysics Road Map and Strategic Plan –

Why You Should Care!

Dave Wark
Imperial College/RAL

Speaking for the PAAP – W. Gear, M.Hindmarsh
J. Knapp, J.Silk, N. Spooner
K.Strain, D.Wark (chair)

PPARC committee structure



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What does the PAAP do?

- Look to long-term strategic structure and priorities in particle astrophysics.
- Is supposed to be one of the main links between the committee structure and the community.
- Feeds input into future allocations through:
  - Road Map
  - Strategic advice
  - Ad hoc input into individual decisions.
- This advice is (surprisingly?) influential!
- Influence it!

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What is Particle Astrophysics? (PPARC-specific definition)

- Gravitational Radiation
- Dark Matter
- CMBR
- Cosmic Rays
- Parts of Neutrino Physics
- Theory
- Fundamental Physics
- Something new?

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The Future Programme…

- Gravitational Radiation
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- GEO600/LIGO operating
- Substantial funds secured in SR2002
- UK full partner in Advanced LIGO
- Next step for ground based - Euro-GW
- Space programme also proceeding
- SMART-2 into LISA – what next?

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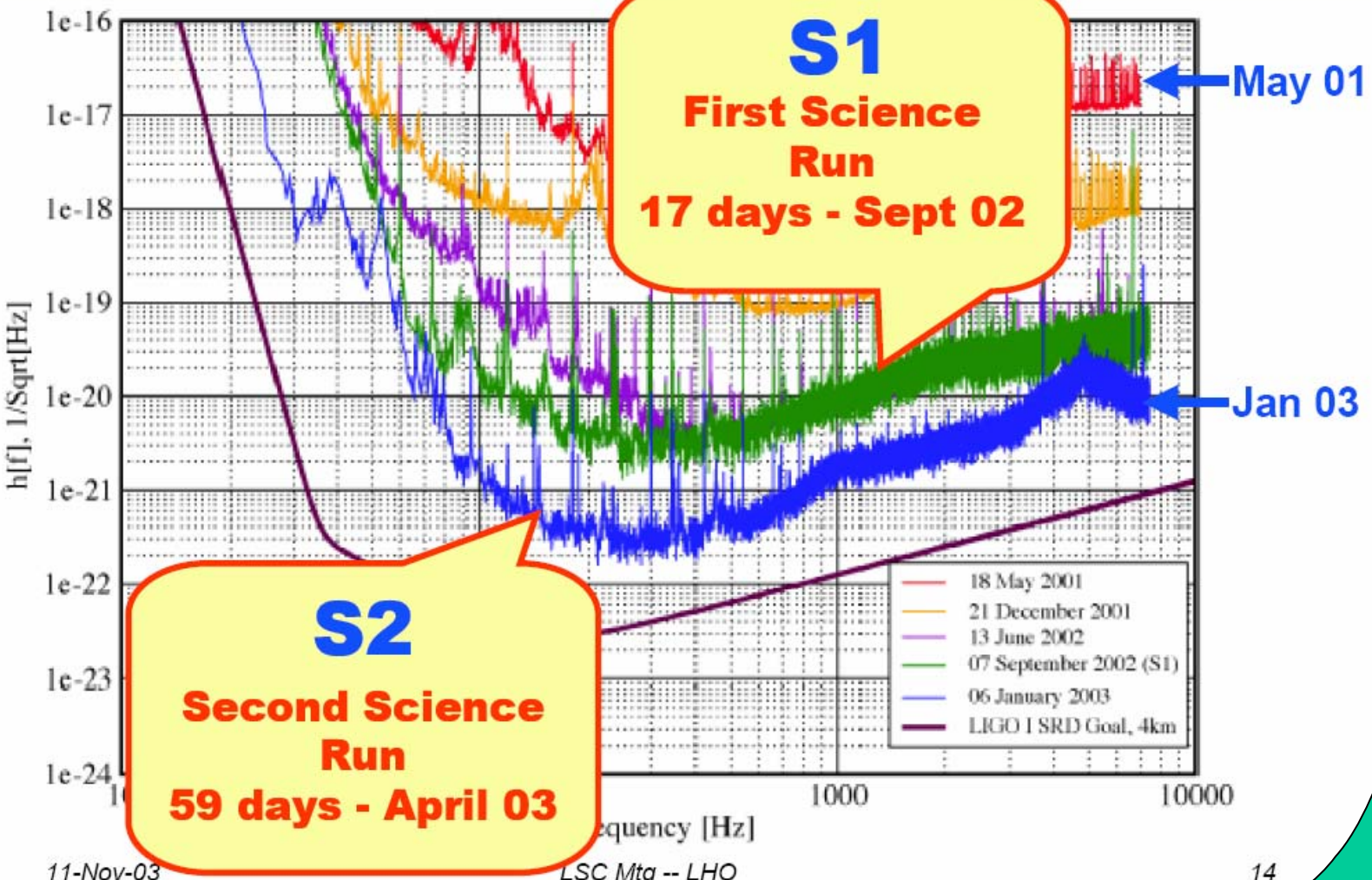
LIGO

LIGO Sensitivity -- L1



S1
First Science Run
17 days - Sept 02

May 01

Jan 03

S2
Second Science Run
59 days - April 03

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- UKDMC and CRESST
- ZEPLIN-I has world leading sensitivity
- DRIFT-1 operating successfully
- Must scale up (towards ton scale)

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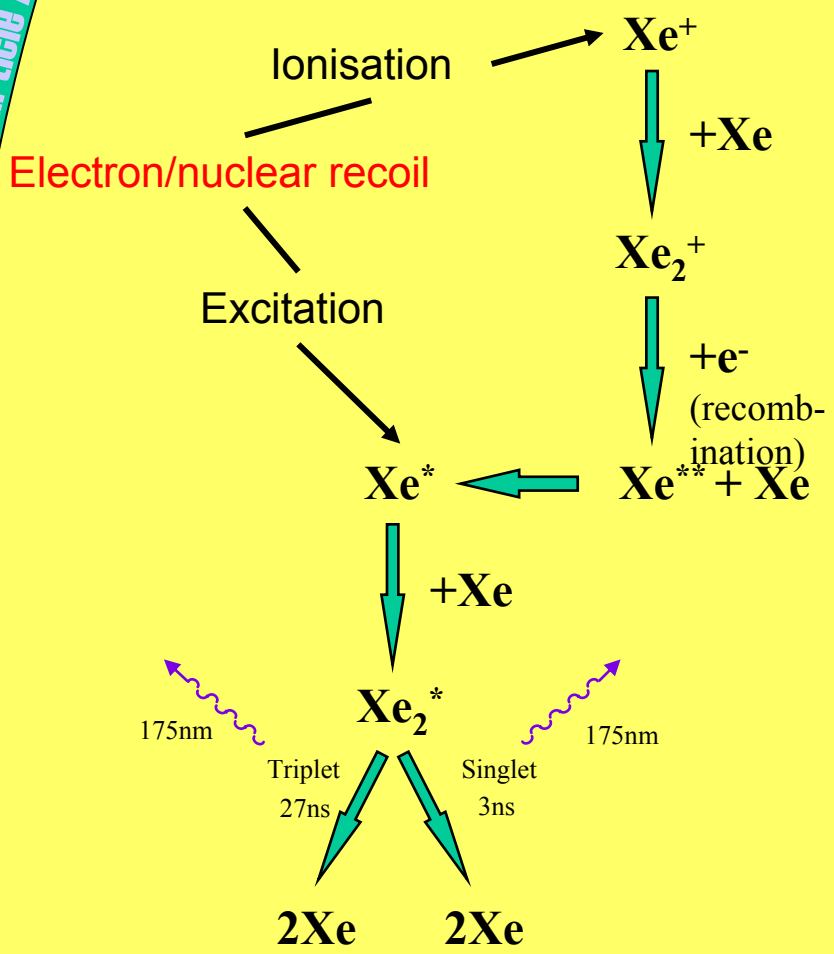
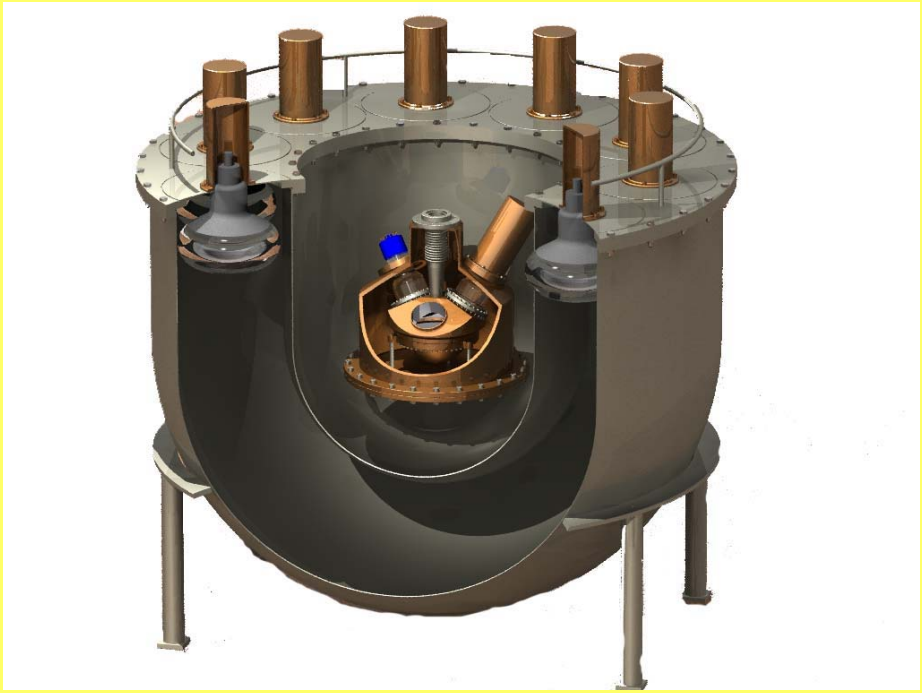
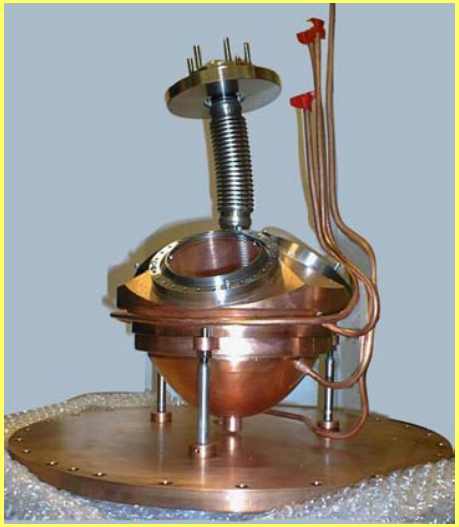
UKDMC - ZEPLIN I







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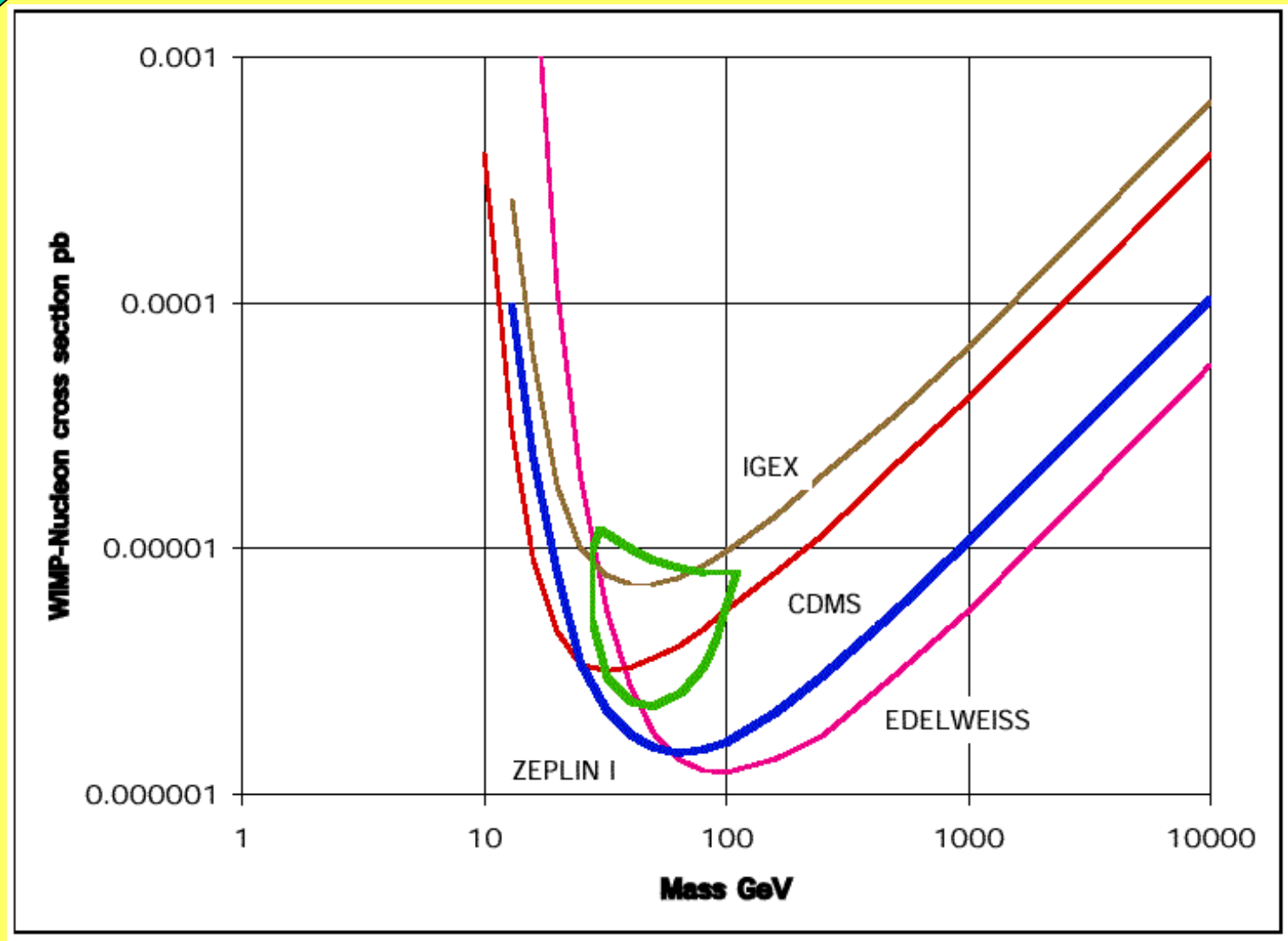

And this is only 75 days ZEPLIN 1 data!

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•Tremendous progress in last decade
•UK groups are world leaders
•Must deliver on current commitments
•Key groups to combine to build bolometric interferometer to detect B-mode polarization

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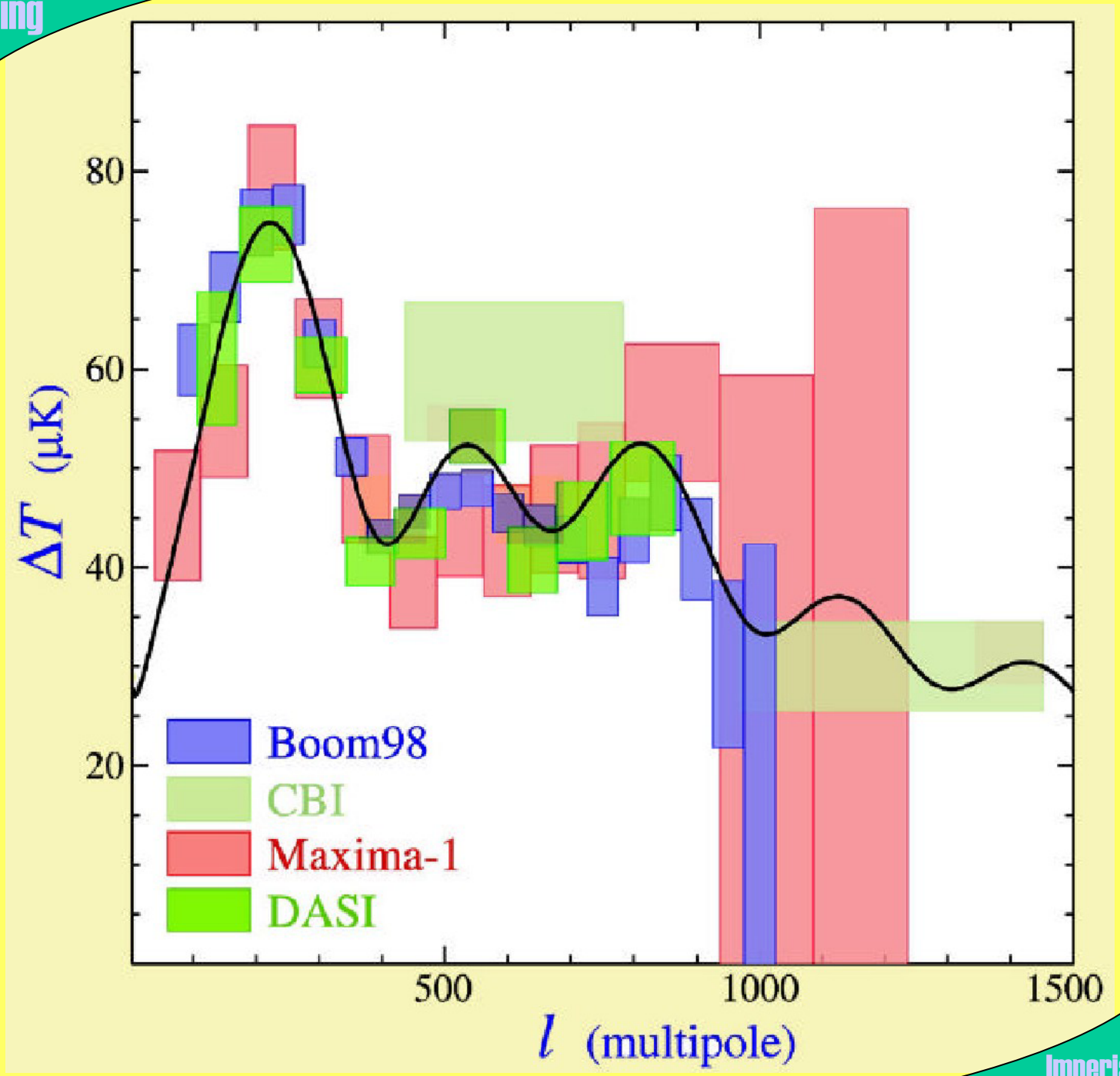
Town Meeting
Apr. 5
'04

Particle Astro...



...Road Map

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Town Meeting
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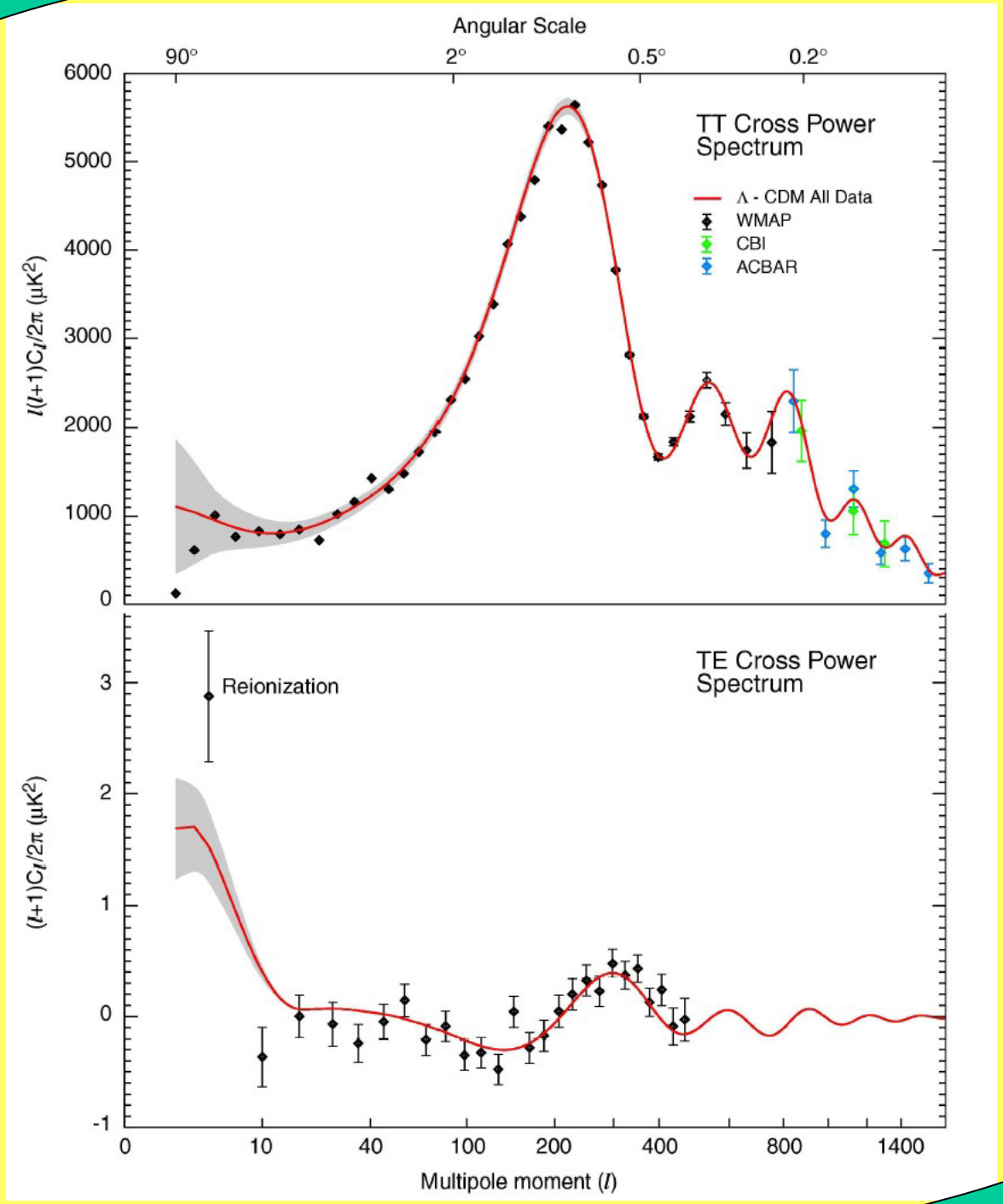
Particle Astro..



...Road Map

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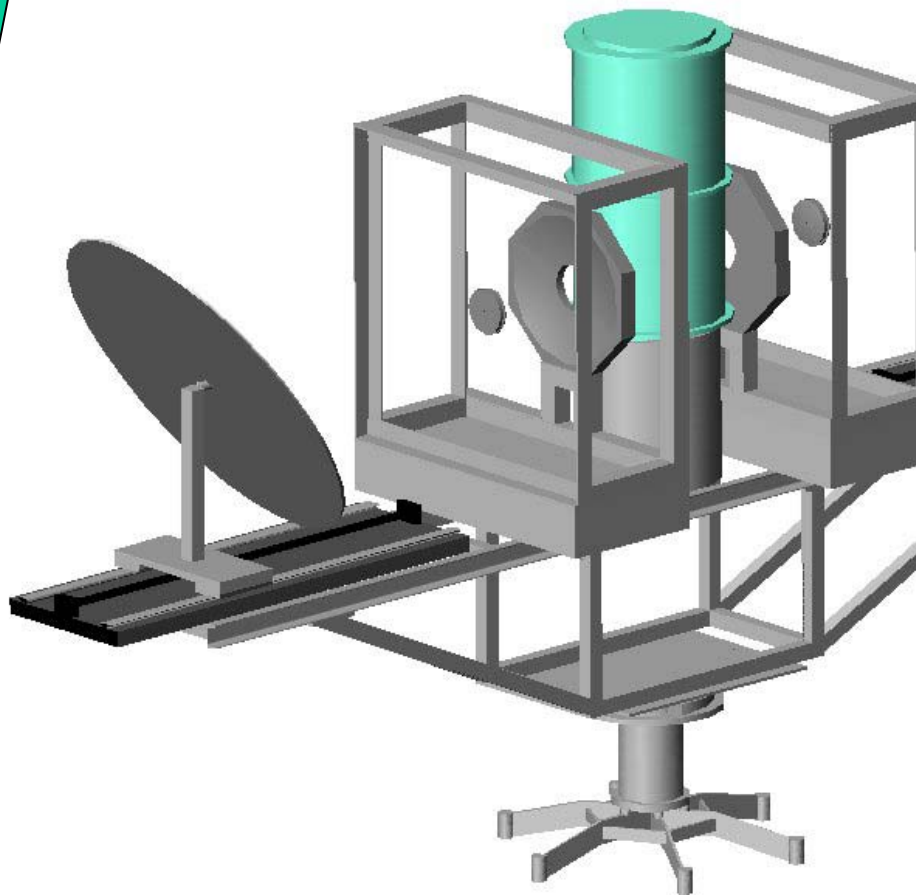
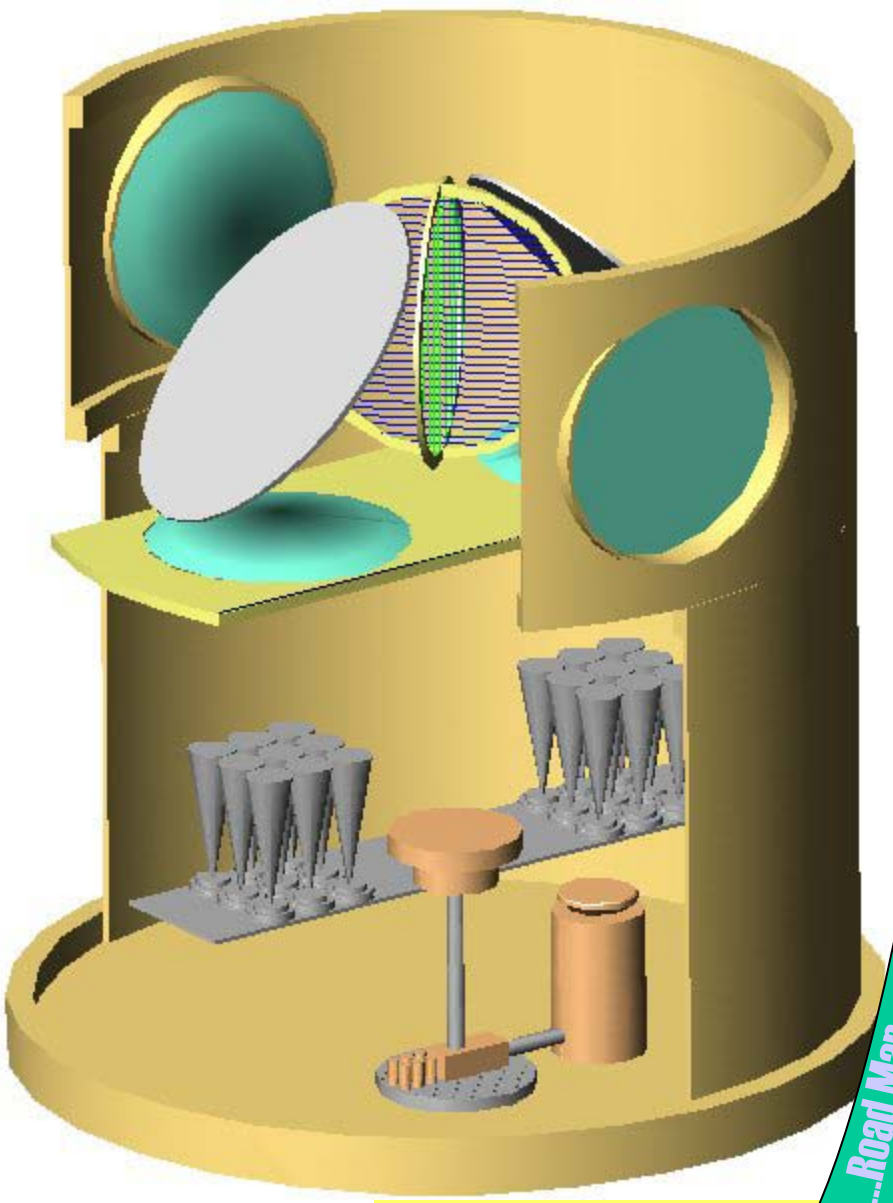
Particle Astro...

MBI





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•AUGER coming on line
•WHIPPLE/HESS leading to VERITAS/HESS2 – high-E γ rays a hot field, with many new results.
•High-energy neutrino astrophysics – will the UK participate?

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- SNO continues…
- MINOS starts in 2005
- Superbeam experiments the next step
- KATRIN/0νββ decay needed
- On to the Neutrino Factory (MICE)…

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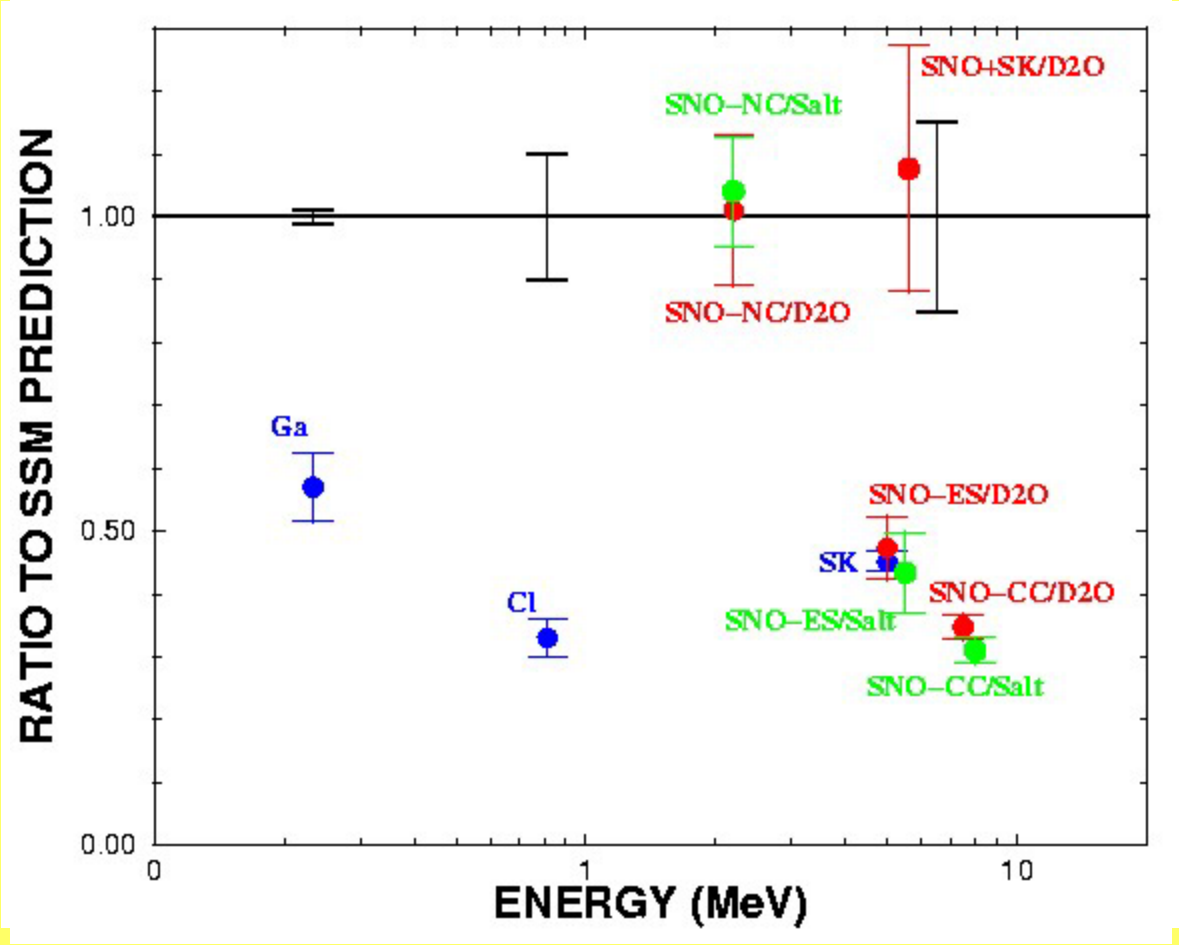
SNO Salt results – Blind Analysis



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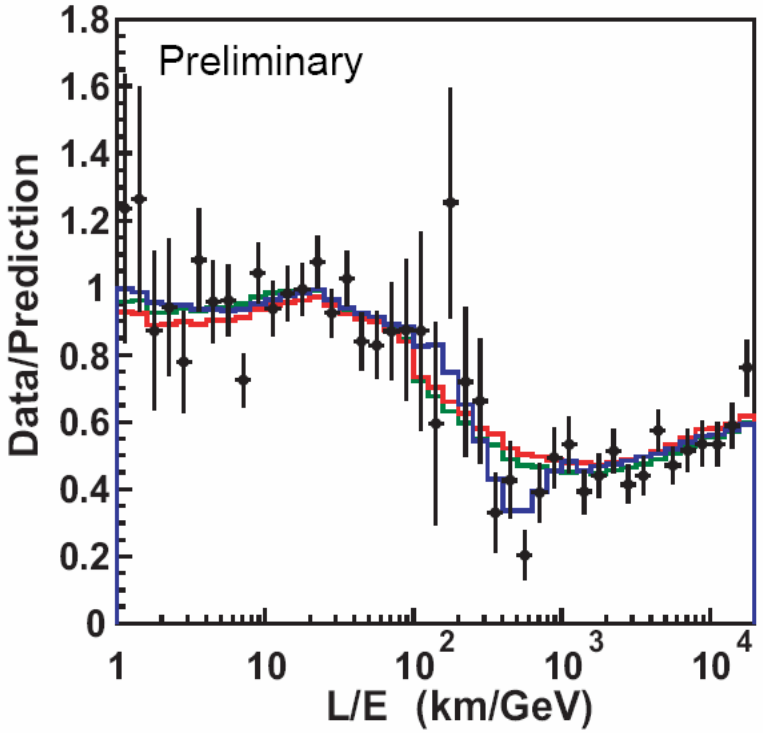
Tests for neutrino decay & decoherence

Oscillation	χ^2_{min}=37.8/40 d.o.f
Decay	χ^2_{min}=49.2/40 d.o.f → $\Delta\chi^2$ =11.4
Decoherence	χ^2_{min}=52.4/40 d.o.f → $\Delta\chi^2$ =14.6



3.4 σ to ν decay

3.8 σ to ν decoherence

First dip observed in data cannot be explained by alternative hypotheses

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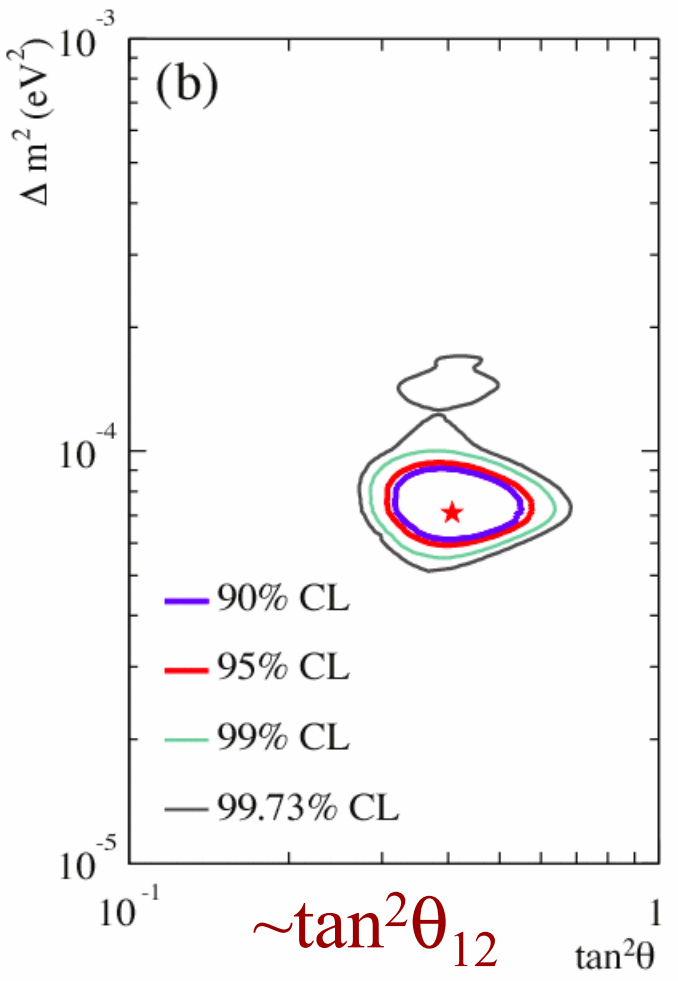
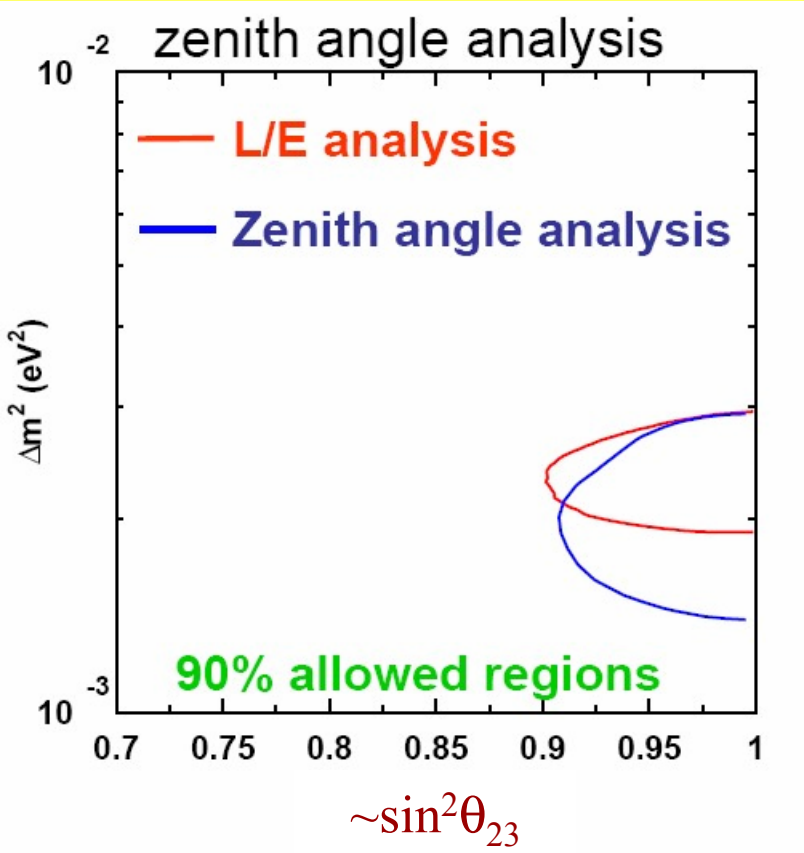
What does this tell us about oscillation parameters?



Solar + KamLAND



Super-K

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•Vibrant, cohesive UK community
•Critically short of postdocs…
•Will the newly approved theory posts do the job for PA? – we have asked for more
•Larger and larger data sets need HPC

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- nEDM
- STEP (?)
- HYPER
- CASIMIR
- Tests of the $1/r^2$ law

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•In the last decade our view of the cosmos has changed radically!
•Our experimental programme hasn't….

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The 2003 PPARC Road Map

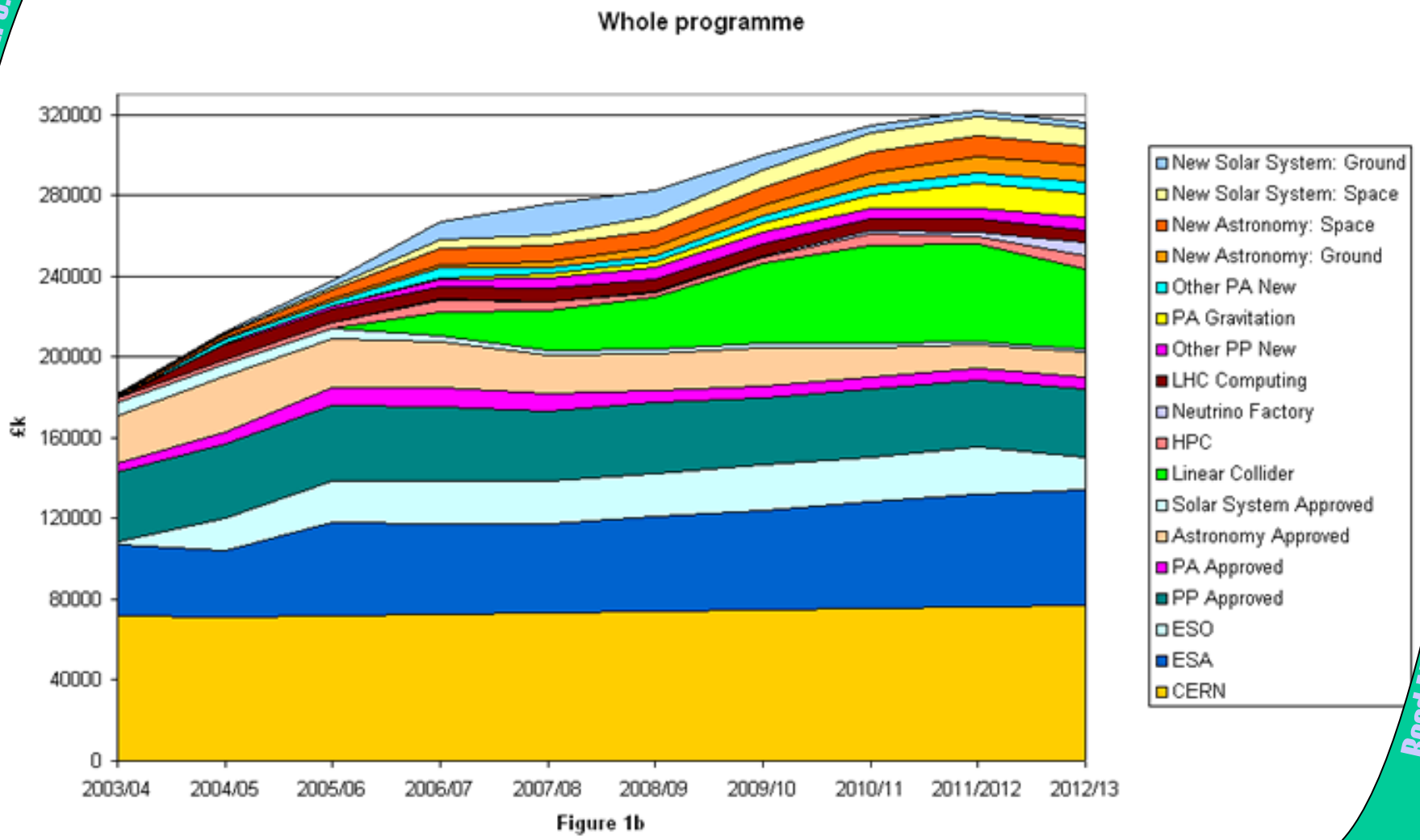

Figure 1b

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The 2003 PPARC Road Map

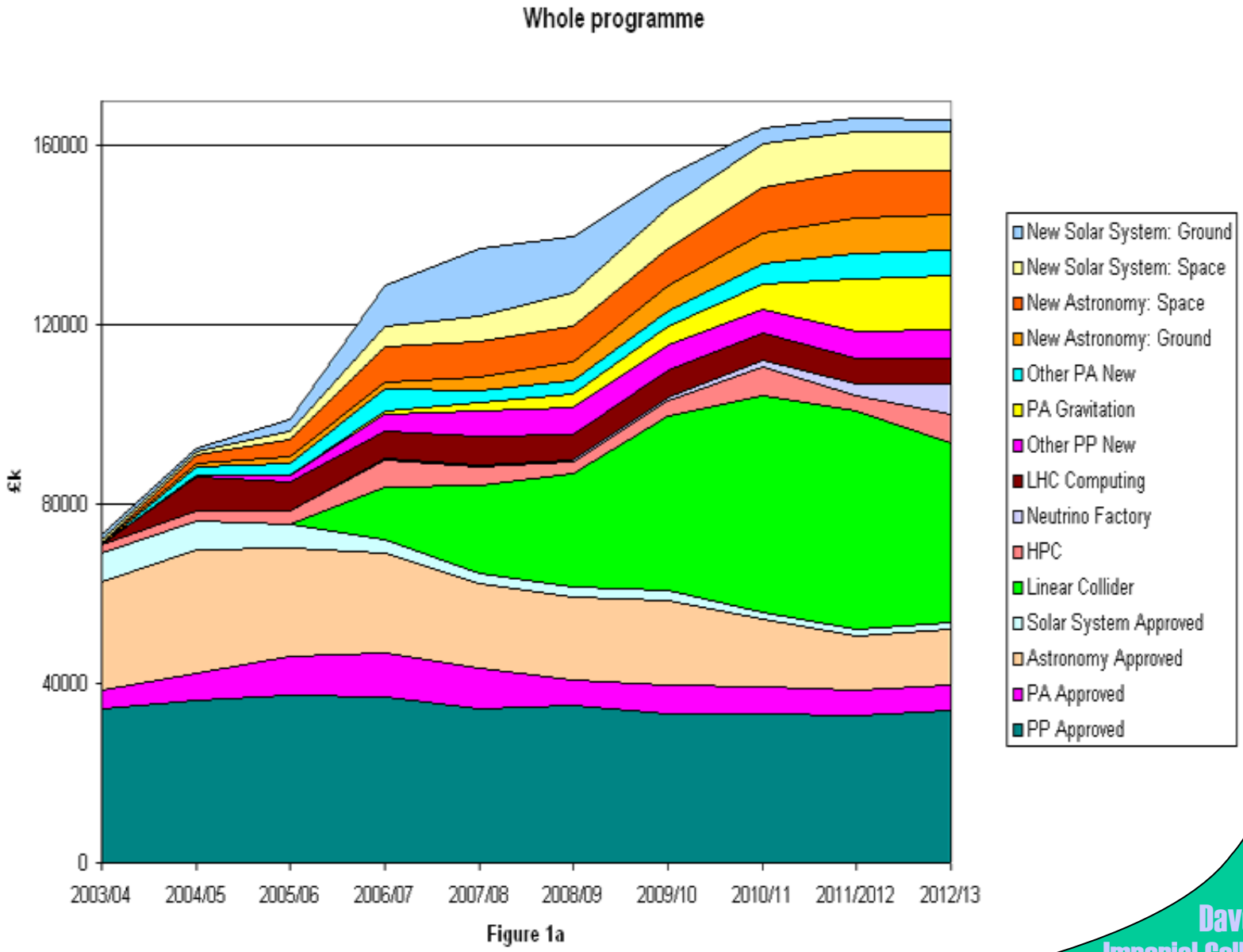

Figure 1a

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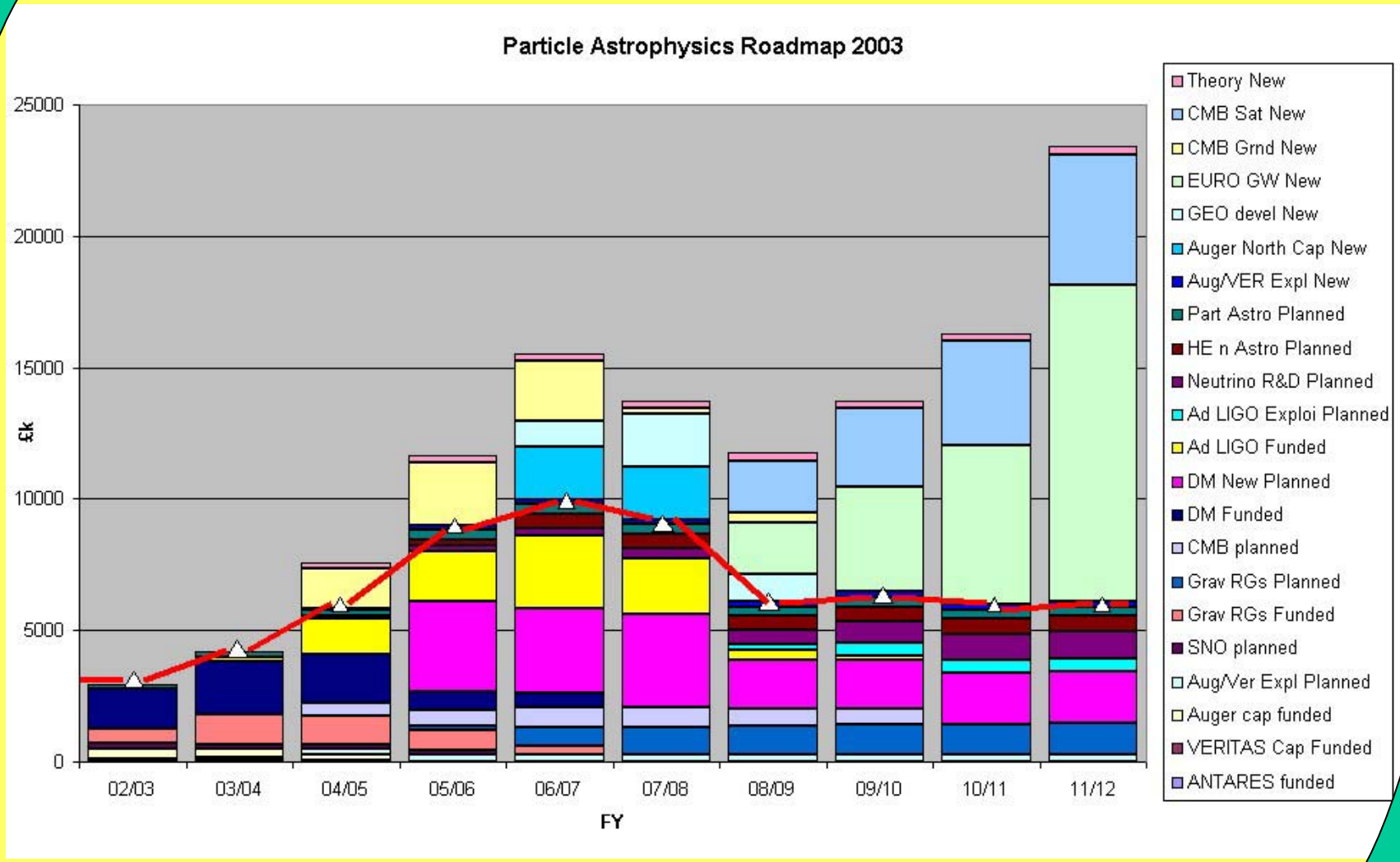
The 2003 PPARC Road Map



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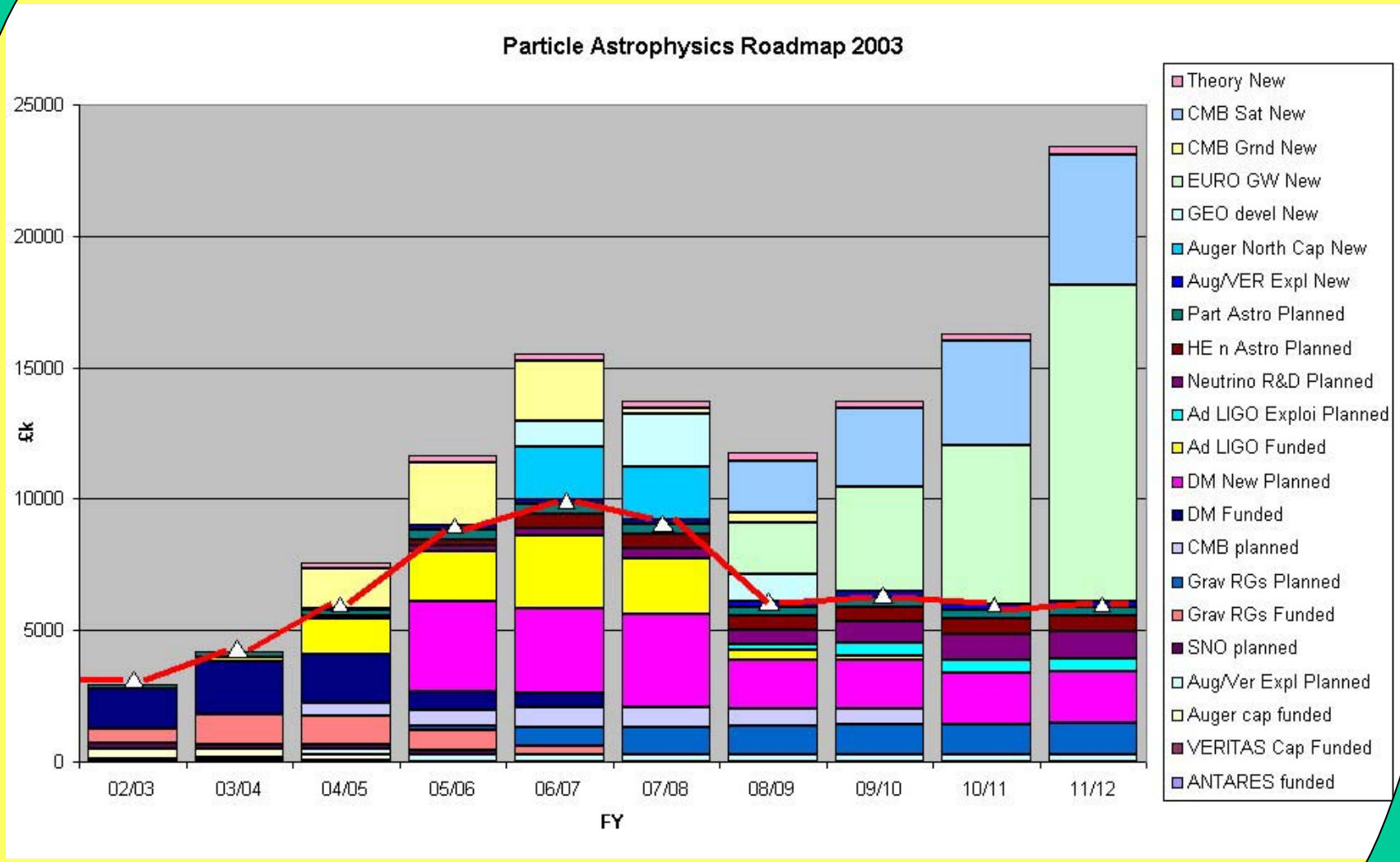

All road map projects are not necessarily funded.

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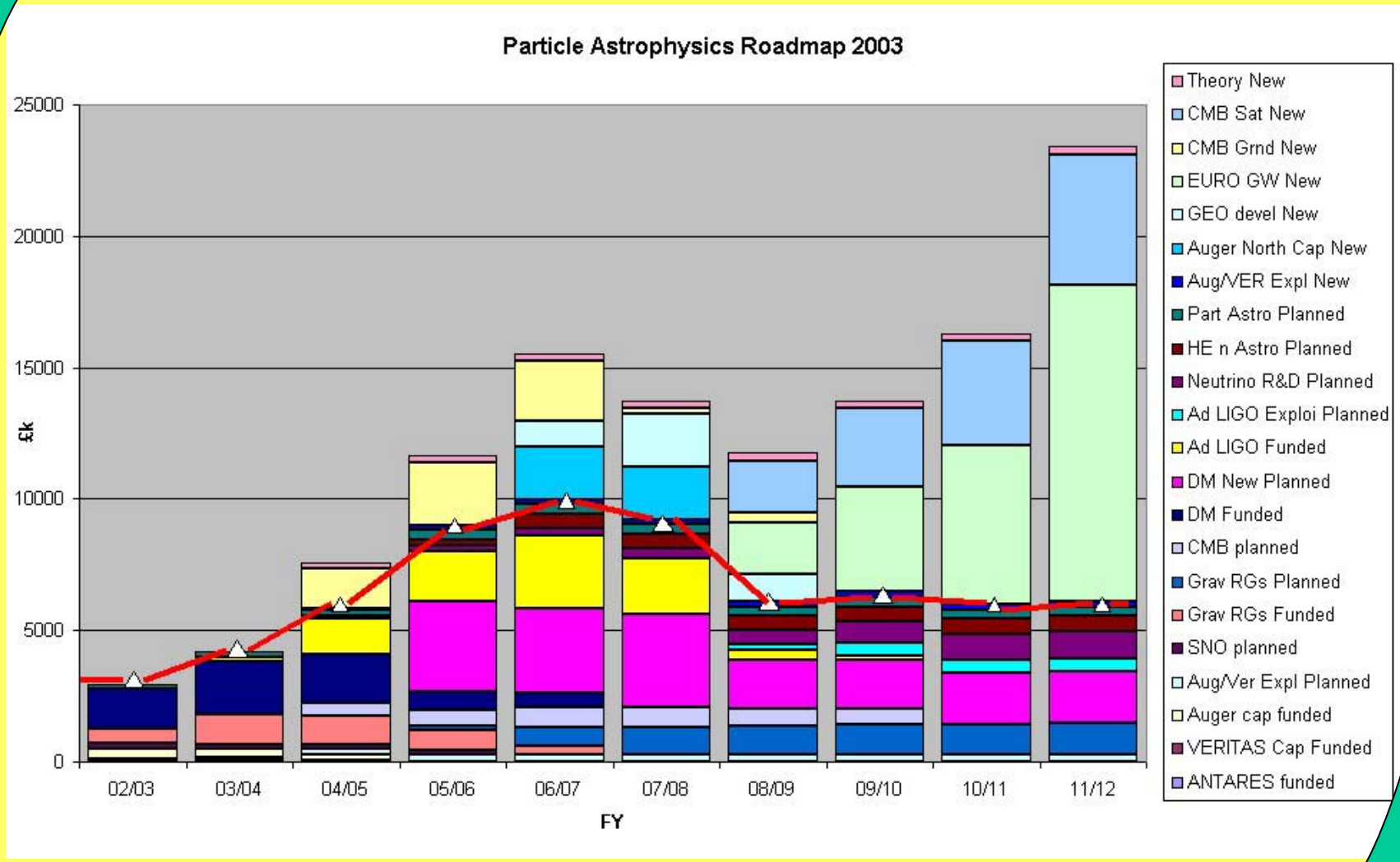
The 2003 PPARC Road Map



A project not in the road map has poor prospects.

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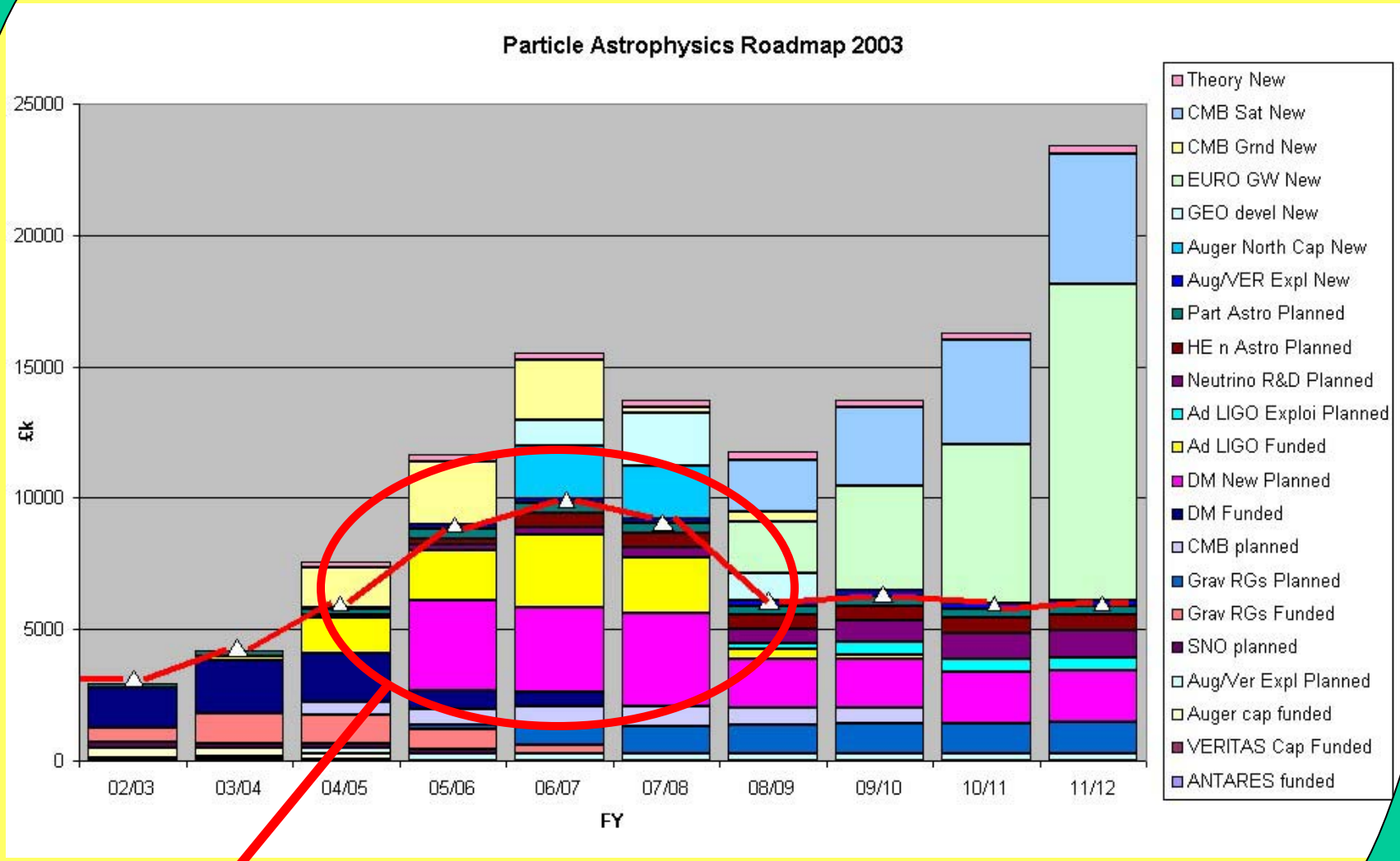
The 2003 PPARC Road Map



The approved PA programme is rapidly growing

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What do you need to do?

- We are meeting in May to update the Road Map for 2004. You should read the existing one and give feedback to the panel.
- You need to help try to keep the panel fully informed of developments in the field, and of any new scientific opportunities. If you are planning a significant new proposal please send an SoI to Science Committee as soon as possible. If I were you, I would copy it to the relevant Advisory Panel(s). I would also copy the AP's with any relevant seedcorn proposals to the PPRP.
- In the autumn the committee will consider strategy. Inputs are very welcome and needed!

Dave Wark
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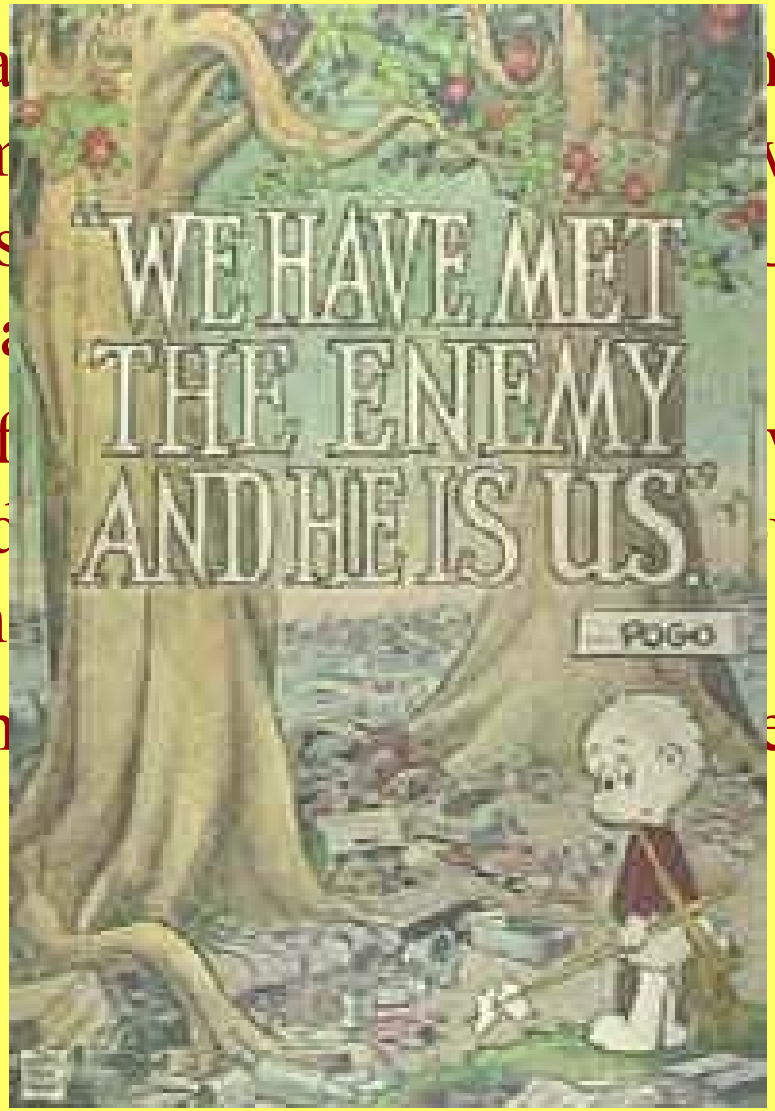
I hear many complaints about "PPARC"

- Usually phra ns were taken by som vhose primary miss JK particle physics and a
- Reality is dif work out, but everybod ush particle physics in th
- Your peers n ecisions.



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Who is us?

- Walter Gear, Cardiff
- Mark Hindmarsh, Sussex
- Johannes Knapp, Leeds
- Joe Silk, Oxford
- Neil Spooner, Sheffield
- Ken Strain, Glasgow
- Dave Wark, Imperial/RAL – d.l.wark@rl.ac.uk