Solar Physics Facilities Review Panel (SPFRP): Review of the UK's Current and Future Potential Investment in Solar Physics Facilities: 2017 – 2025+

Panel Membership: Gerry Doyle (Chair), Daniel Brown, Bill Chaplin, Ineke De Moortel, Robertus Erdelyl, Huw Morgan

SCOPE: The Solar Physics Facilities Review Panel (SPFRP) was an ad hoc panel formed at the request of STFC Science Board to undertake a strategic review of UK needs and access requirements on current and future solar physics facilities. The objective is to ensure that the strategic landscape in this research area is well-defined and up-to-date.

We were asked to produce a new report, highlighting changes since the 2015 Roadmap, showing the pathway and recommendations for the development of future capabilities and facilities.

Two face-to-face meeting + one Skype meeting + community survey

Questions asked included:

What is your primary research area in solar physics?

What are your top 3 science questions (with reference to the SSAP Roadmap)?

What solar facilities do you need to address these questions/goals?

How important are these strengths for the UK currently?

How important are these strengths for the UK in the next 5-10 years (on a scale of 1-10)?

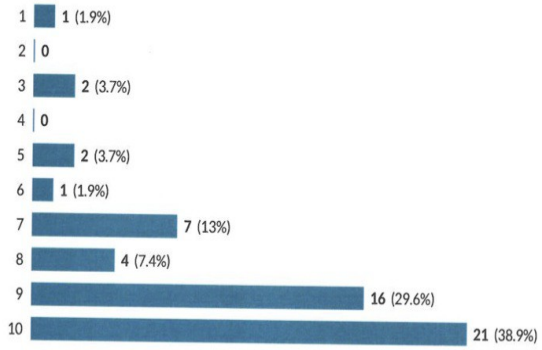
What facilities, technologies or capabilities shoukd be provuded for the UK Solar Physics in the next 5-10 years?

Do you see potential for industrial engagement?

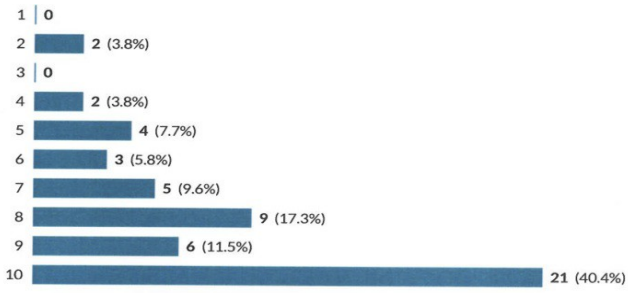
Unfortunately, the response was around 50% with limited and in some instance little input from some groups.

How important are these strengths for the UK in the next 5-10 years (on a scale of 1-10)?

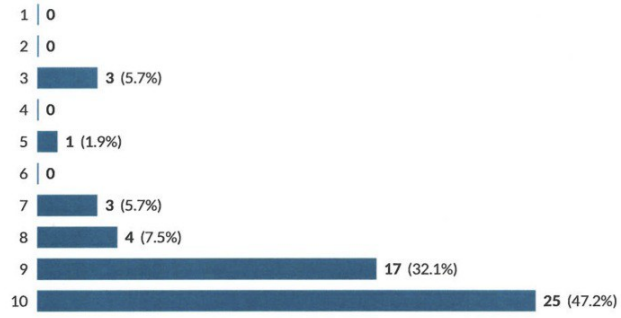
Theory



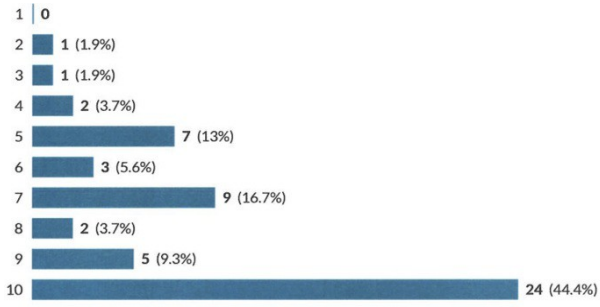
Instrumentation



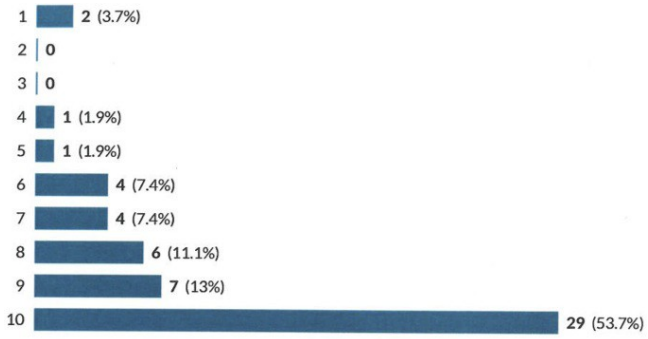
HPC



Ground



Space



Summary of community feedback

The main points raised by the UK Solar Physics community input may be summarized as follows:

- ➔ The community needs multi-wavelength high-resolution coverage across a range of facilities, both space- and ground-based. A general comment was that future investment should not be at the expense of these core strengths, where the UK community is internationally leading.

- ➔ The recommendations and conclusions of the Roadmap for Solar System Research, produced by the Solar System Advisory Panel in 2015, still stand.

- ➔ More than 50% of the facilities used by the community have no major UK investment, yet they are an integral part of the community's multi-wavelength/multi-access needs.

- ➔ Community strengths lie mostly in theory, HPC and space-based observations; but ground-based observations are clearly an emerging area, and featured stronger when community members flagged future strengths.

- ➔ There were very strong statements made regarding HPC requirements. A common concern raised was that current arrangements regarding HPC provision are inadequate to accommodate the modelling demands placed by modern data and analysis requirements. Significant improvements in capacity, speed and access are needed, otherwise the UK community will not be able to capitalize on its undoubted strengths and expertise in this area.

- ➔ The community feels strongly that additional support is needed for more PhD students and postdoctoral researchers, to realize the full exploitation of the UK investment made in solar physics facilities.

- ➔ With regards to the industrial engagement and the impact agenda, no significant changes compared on the 2015 Roadmap (e.g., opportunities relating to space weather forecasting and involvement in bespoke space weather missions, with space weather events being on the National Risk Register).

- ➔ The UK has a growing community in ground-based solar physics. The community currently uses three ground-based facilities, SST, Dunn Solar Telescope and Big Bear with interest in instruments that will be part of India's proposed building of a 2m-class facility, and the European Solar Telescope. DKIST observing will start in late 2019.

- ➔ There are important opportunities in the space-weather domain, where the UK community is able to bring its expertise and experience to bear both in terms of modelling and also active involvement in future planned bespoke space-weather missions like Carrington. The UK community needs to be alert and pro-active to potential opportunities in this area.

- ➔ Some Universities are beginning to take advantage of small mission or R&D opportunities (e.g. cubesats, small rocket launches etc.), Science Board and UKSA) may want to consider whether there is scope for seed-corn funding to help support such activities, which may act as an important springboard for future activities and industrial engagement.