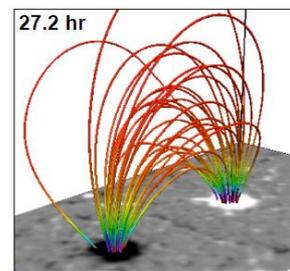# Solar and Heliospheric Centre

Andrzej Fludra, STFC RAL

A **research facility** for the Solar Physics community for coordinated exploration of the outstanding questions in the physics of the Sun and the Heliosphere, providing:

- numerical modelling of the magnetic structure of the Sun's extended atmosphere, its dynamic phenomena, and relevant processes in hot astrophysical plasmas.

- access to and tools for exploitation of large volumes of data from 20+ space missions and ground-based telescopes

- The Solar and Heliospheric Centre will provide a focal point and bring together the UK observers, data analysts, theorists and modellers in a concerted effort to solve the big questions in solar and heliospheric physics
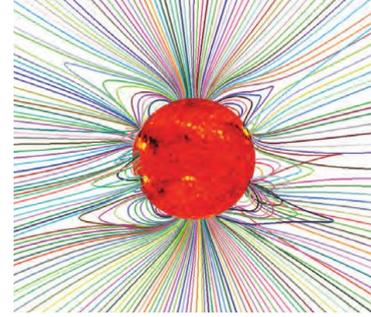
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The Solar and Heliospheric Centre will combine Big Data analysis and High Performance Computing:

(a) provide a comprehensive modelling capability both drawing on and supporting existing skills of the UK Solar Physics modelling community,
- Make available (run on demand), support and guide the continued development of selected algorithms for modelling of the complex dynamic processes in the Sun's atmosphere and the extended corona (e.g., 3D MHD models).
- develop data post-processing and visualisation tools to connect the model results to observations

(b) the development of algorithms and software to process and analyse big data sets from numerous space missions, to exploit large volume of complex multi-wavelength, multi-instrument data

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What we will get:

- A UK community platform to support solar physics research
- Dedicated HPC capability and storage
- A set of numerical models with computing time to run them
- Permanent repository of model calculations
- Access to data from 20 missions and observatories (+ temporary storage space)
- Data analysis software
- Support from the Centre staff

Who will benefit:

1. Everyone who:
- Is interested in calculating numerical models – e.g., 3D MHD of active regions, quiet Sun, large scale corona, solar wind, flare models, CME onset, particle acceleration, transport processes in the heliosphere, plasma physics and spectroscopy calculations
- Wants to compare observations with models and model visualisations
- Wants to combine data from several missions

2. Model creators and developers – funded to make their models user-friendly, provide manuals, develop model extensions

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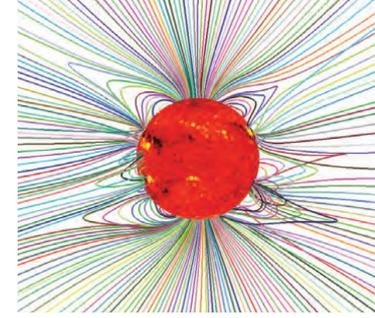
Who will benefit (cont.):

- Develop interdisciplinary links to several related areas of physics: plasma physics, magnetohydrodynamics, kinetic theory, particle transport theory, spectroscopy and atomic physics
- Contribute to PhD education and post-doctoral training
- Outreach, with high potential for public engagement. The Sun and the solar activity have always attracted great interest in general public.

Examples and liaisons:

Complementary to NASA-led CCMC (Community Coordinated Modelling Center) - learn from their experience

UK MHD consortium – involve in model provision

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