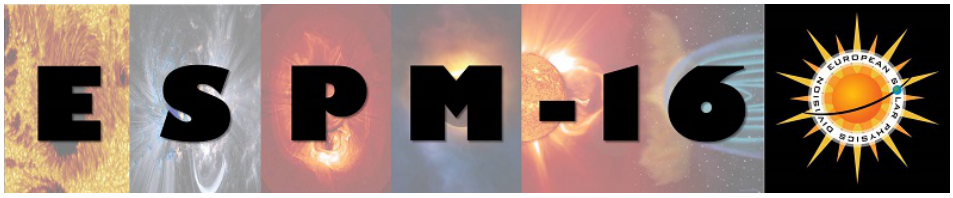

Contribution ID: **376** Type: **Poster**

Effect time-dependent reverse-flow in meridional circulation on the evolution of spot-producing toroidal fields and implications on observed short-term variability in polar faculae

Monday 6 September 2021 11:37 (13 minutes)

In various classes of dynamo models, spot-producing magnetic fields are generated as axisymmetric toroidal flux-ropes. While mean-field models produce axisymmetric broad toroidal fields, full 3D convective models produce axisymmetric toroidal wreaths. All these models can reproduce various longitude-averaged features, such as solar-like butterfly diagrams. In recent simulations, we show that time-dependent non-axisymmetric m=1 type flows can originate due to nonlinear hydrodynamics of differential rotation. This non-axisymmetric flows will affect the axisymmetric meridional circulation, causing time-dependence in the reverse flow cell. We show that a dynamo, operating with such a time-dependent meridional circulation can explain the short-term variability (with periods of the order of a month) in the evolution of faculae around 75-degree latitudes, which have very recently been observed. We present results from various simulation experiments to determine what model conditions best-simulate the facular evolution. We also compare our results with the observations of surface active regions' evolutions as revealed from magnetograms.

Student poster?

Authors: Dr BELUCZ, Bernadett (1) Solar Physics and Space Plasma Research Centre, School of Mathematics and Statistics, University of Sheffield, Hicks Building, Hounsfield Road Sheffield, S3 7RH, UK, 2)Department of Astronomy, Eötvös Loránd University, 1/A Pázmány Péter sétány, H-1117, Budapest, Hungary, 3)Gyula Bay Zoltań Solar Observatory (GSO), Hungarian Solar Physics Foundation (HSPF), Petőfi tér 3., Gyula, H-5700, Hungary); Dr DIKPATI, Mausumi (High Altitude Observatory, NCAR, 3080 Center Green Dr., Boulder, Colorado 80301, USA); Prof. ERDELYI, Robert (1) Solar Physics and Space Plasma Research Centre, School of Mathematics and Statistics, University of Sheffield, Hicks Building, Hounsfield Road Sheffield, S3 7RH, UK, 2)Department of Astronomy, Eötvös Loránd University, 1/A Pázmány Péter sétány, H-1117, Budapest, Hungary, 3)Gyula Bay Zoltań Solar Observatory (GSO), Hungarian Solar Physics Foundation (HSPF), Petőfi tér 3., Gyula, H-5700, Hungary)

Presenter: Dr BELUCZ, Bernadett (1) Solar Physics and Space Plasma Research Centre, School of Mathematics and Statistics, University of Sheffield, Hicks Building, Hounsfield Road Sheffield, S3 7RH, UK, 2)Department of Astronomy, Eötvös Loránd University, 1/A Pázmány Péter sétány, H-1117, Budapest, Hungary, 3)Gyula Bay Zoltań Solar Observatory (GSO), Hungarian Solar Physics Foundation (HSPF), Petőfi tér 3., Gyula, H-5700, Hungary)

Session Classification: Poster Session 1.1

Track Classification: Session 1 - Solar Interior, Dynamo, Large-Scale Flows and the Solar Cycle