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First Detection of Torsional Oscillations within a Magnetic Pore in the Solar Photosphere

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Alfvén waves have proven to be important in a range of physical systems due to their ability to transport non-thermal energy over long distances in a magnetised plasma. This property is of specific interest in solar physics where the extreme heating of the atmosphere of the Sun remains unexplained. In an inhomogeneous plasma like a flux tube in the solar atmosphere, they manifest as incompressible torsional perturbations. However, despite evidences in the upper atmosphere, they have not been directly observed in the photosphere. Here, we report the detection of anti-phase incompressible torsional oscillations observed in a magnetic pore in the photosphere by the Interferometric Bldimensional Spectropolarimeter (IBIS). State-of-the-art numerical simulations suggest that a kink mode is a possible excitation mechanism of these waves.

The excitation of torsional waves in photospheric magnetic structures can significantly contribute to the energy transport in the solar atmosphere and the acceleration of the solar wind, especially if such signatures will be ubiquitously detected in even smaller structures with the forthcoming next generation of solar telescopes.

Primary author: STANGALINI, Marco (ASI Agenzia Spaziale Italiana)

Co-authors: Prof. ERDÉLYI, Robertus; Dr BOOCOCK, Callum; Dr TSIKLAURI, David; Dr KORSÓS, Marianna; Dr NELSON, Christopher; Dr DEL MORO, Dario; Prof. BERRILLI, Francesco

Presenter: STANGALINI, Marco (ASI Agenzia Spaziale Italiana)

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