

School of Physical Sciences Seminar

All welcome to attend the first seminar of this semester series on Thursday 19th October at 1pm in N115. Refreshments will be provided

Speaker: Alberto Canisares DCU PHA Graduate 2015, currently PhD DIAS

Title: Multilateration of Type III solar radio bursts using the BayEsian Localization Algorithm (BELLA)

Abstract: Solar radio bursts such as Type IIs and IIIs are emitted by electrons propagating through the corona and interplanetary space. Tracking such bursts is key to understanding the properties of accelerated electrons and radio waves, together with the local plasma environment that they propagate through. Here, we present the BayEsian Localization Algorithm (BELLA), a Python-based algorithm that evaluates radio burst positions and uncertainties using multilateration and Bayesian methods. BELLA was validated using simulations and a Type III solar radio burst observed by STEREO A and STEREO B (at ± 116 degrees) and WIND (at L1). BELLA successfully tracked the Type III from ~ 3 –140 R_{sun} (2–0.15 MHz) along a spiral trajectory. This also enabled us to derive a solar wind speed of ~ 400 km/s, consistent with simulations of the solar wind and interplanetary magnetic field from the Heliospheric Upwind Extrapolation with time dependence (HUXt). BELLA results were also compared with positions derived from a time-difference-of-arrival (TDOA) method and the Solar radio burst Electron Motion Tracker (SEMP).