Signal processing of fast radio burst

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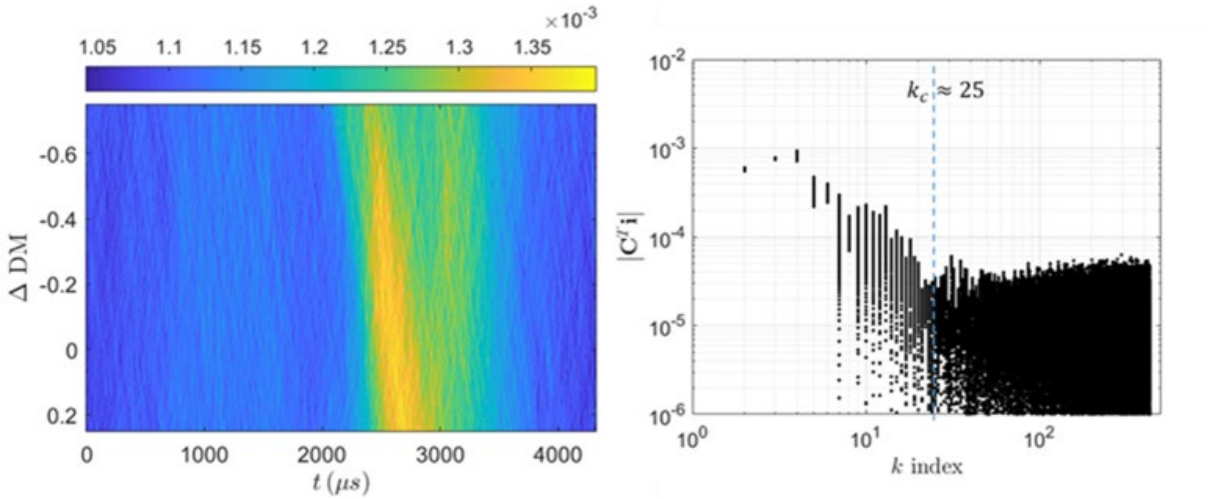
Description:
Fast radio bursts (FRBs) are enigmatic extragalactic radio transients of unknown origin. Lasting for mere milliseconds, they reach us from galaxies billions of light years away. Theories as to their origin include giant flares from magnetars and merging neutron stars. Regardless of their origin, these bursts can be used as impulses with which to probe the structure of matter in the Universe, and they have recently been used to find the so-called 'missing matter' in the giant voids between galaxies.

The Australian Square Kilometre Array Pathfinder (ASKAP) is currently the best tool for studying FRBs. The phased array feed (PAF) technology in ASKAP enables localization of the burst which permits follow up with optical telescopes to pinpoint the host galaxy of the burst. Furthermore, ASKAP is in the process of commissioning a burst detection system to enhance the rate of FRB detection. Curtin Institute of Radio Astronomy (CIRA) is engaged in FRB research using ASKAP with a team of researchers and HDR students actively collaborating with CSIRO, Swinburne Institute of Technology and leading international institutions.

The goal of this project is to develop signal processing tools for revealing the properties of detected FRBs. Such tools are expected to facilitate studies regarding the structure of the FRB, the uncertainties of the detection, and the emission mechanisms.



Analysis of an FRB in time domain and in discrete cosine basis