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MODELING FAST RADIO BURSTS USING THE KLT

Abstract

Fast Radio Bursts (FRBs) are highly energetic radio pulses that are believed to originate outside the Milky Way. FRBs are observed as broadband signals that only last a few milliseconds. Out of the 30 FRBs that have been observed to date, only one is "repeating" itself. By solving the mystery of their origin and progenitors, astronomers will be able to use FRB's to address a range of open questions about cosmology, intergalactic magnetic fields and general relativity. Searching for transients such as FRB's involves the detection of dispersed pulses in noise. The Karhunen-Loève Transform (KLT) is a mathematical algorithm used to model stochastic processes in time. Despite being computationally demanding, it adapts its expansion basis to the signal, works well for both stationary and non-stationary input stochastic processes and for both narrow and wide band signals. It is therefore the most appropriate

tool for modeling transient signals like FRBs. A speculative suggestion is that FRBs are of artificial origin. The hypothesis is that the FRB parameters favorably relate to those of beams powering huge light sails, the latter being manifestations of technological activity of advanced extragalactic civilizations. If such beam models for FRBs are accepted, then a weak FRB may signify inter-planetary light sail voyages. The weak signal detection capability of KLT is thus relevant also in such situations. We will present the application of the relativistic KLT to samples of FRB signals.