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Book of Abstracts

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Future Constraints on Dark Energy using 21cm observations with SKA1-mid

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In this work, we study the future constraints on dark energy models using 3D 21-cm power spectrum for SKA1-mid. We use three parametrisations for the dark energy equation of state. For each model, we compare the deviations in 3D power spectrum for each parametrisation from concordance LCDM model. We show that the SKA1-mid will be able to put significantly tighter constraints on dark energy behaviour compared to present constraints.

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Tilted thin accretion disk around a spinning black hole

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Inner part of a thin accretion disk around a Kerr black hole plays an important role in understanding the fundamental physics of the strong gravity regime. A tilt of such a disk about the spin axis of the black hole leaves an imprint on the observation by affecting the observed spectral and timing properties of the disk X-ray emission via LT precession. The inner part of such a disk was predicted to become aligned with the spin direction of the black hole by Bardeen-Petterson effect. But a recent X-ray observation of the accreting black hole H1743-322 suggests the inner disk could be tilted. In this work, we explore this possibility by building a model without assuming a priori that the inner disk is aligned with the black hole spin, and analytically as well as numerically study the behaviour of the radial profile of the disk tilt angle in the steady state as a function of several system parameters.

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On modelling the Fast Radio Burst population and event rate predictions

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Fast Radio Bursts (FRB) are highly energetic ($\sim 10^{33}$ J), short duration (ms) radio pulses. The dispersion and the scatter broadening in the observed pulse width of the detected FRBs exhibit the

propagation effect in the cold ionized plasma of the interstellar medium of the Milky Way and the host galaxy of the source and the intergalactic medium. The exact source mechanism of FRBs and its energy distribution are still matters of debate. The recent literatures have shown the connection between the high energetic neutrino and the Fast Radio Burst, but there is no detection of neutrino emission from FRBs with six years of IceCube Data to date. Those uncertainties can be addressed with the help of statistical inference. The detection of a large number of FRBs by using low frequency radio telescope can answer some of those questions.

In the first half of my talk, I will discuss our generic model for the event rate estimation of FRBs for any radio telescope with given parameters and I will show our predictions for the Ooty Wide Field Array (OWFA) and the upgraded Giant Meterwave Radio Telescope (uGMRT).

In the second half of my talk, I will try to constrain the energy distribution and the spectral index of FRBs along with the scattering mechanism in the intergalactic medium by using statistical hypothesis testing.