



A multi-beam time-domain survey instrument for discovering Fast Radio Bursts and Pulsars with the GMRT

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Time domain astronomy (i.e. the study of rapidly varying sources) is a new and rapidly growing field of research. Two important classes of rapidly varying celestial radio sources are pulsars and Fast Radio Bursts (FRBs). Pulsars provide a valuable means for probing the most extreme states of matter, whereas FRBs are probes of extreme states of gravity and magnetic fields as well as unique probes of the cosmological evolution of the ionized intergalactic medium (IGM). I will describe a project at the GMRT to build a software digital processing system to enable real-time commensal (“piggy-back” with any other on-going observations) search for FRBs, pulsars and other transients with a PetaFlop system funded under National Supercomputing Mission (NSM). The aimed instrument hosting a large number of GPUs executing real-time HPC and AI applications will constitute a globally leading facility in this field of astronomy. It will be the first one to have simultaneous detection and arc-second localisation capability over the full 300-1460 MHz radio spectrum. We anticipate that this will have a very high scientific impact since localization is critical for using these bursts as cosmological probes while studying the IGM. This sophisticated state-of-the-art digital processing system for the GMRT not only will enable transformational science on transient radio sources but will also achieve a technological milestone in delivering a large scale commensal survey instrument for the largest interferometric array of the world.