Proposal Abstract:

We aim at the first detection of FRBs at z>5 with the superb sensitivity of FAST, taking advantage of gravitational-lens magnifications. FRBs at *z*>5 will be extremely useful cosmic probes because they provide us with unique approaches to key science, including cosmic reionization history, dark energy, dark matter, etc. However, the large commensal FRB survey with FAST, CRAFTS, has been sensitive to only the brightest population of FRBs at *z*>5, where their event rates would be too low to detect, leading to the non-detection of such high-*z* FRBs. To overcome this problem, we focus on the field gravitationally lensed by the galaxy cluster at *z*=0.356, MACS0308+26. The typical magnification factor in this field is >10, which enables FAST to detect one order of magnitude fainter FRB populations at *z*>5 than ever. The energy function of FRBs suggests that such fainter populations are five orders of magnitude more abundant than the brightest ones. With this extremely high gain, we will achieve a ~5 times better chance to detect FRBs at *z*>5 than CRAFTS within only ~0.5% observational time of CRAFTS. The first evidence of FRBs at *z*>5 might be discovered by this project.