

A Study of an Unexplored Population of "Fast" Radio Supernovae

Abstract

Stripped envelope supernovae of Type Ic have usually been observed either as ordinary subrelativistic supernovae (fastest ejecta $\sim 0.1c$) or as relativistic events. Only a few cases of type Ic supernovae with high intermediate velocity ejecta in between those two subclasses have been discovered and studied. Some of these intermediate events exhibit radio emission that is rapidly declining, at the low GHz frequencies, within less than 10 days after explosion. This suggests that the SN ejecta is expanding at high velocity ($>0.3c$) in circumstellar material (CSM) which density is lower by a factor of ~ 10 than the CSM around ordinary Type Ic supernovae. Until recently, the discovery of such "fast" fading radio supernovae has been challenging. Leaving this population of supernovae unexplored may have led to a biased view of radio Type Ic supernovae. Here, we propose using the new early detection capabilities of optical time-domain surveys coupled with the enhanced sensitivity of the MeerKAT telescope to study the unexplored population of fast radio SNe.