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Shedding light on the FRB phenomenon using Italian radiotelescopes

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Fast radio bursts (FRBs) are bright millisecond radio transients observed at extragalactic distances, whose origin is still highly debated. In this presentation, I summarize the key findings from two recent studies that leverage observations conducted with the Northern Cross radio telescope at 408 MHz, aimed at shedding light on the enigmatic FRB phenomenon. We investigated how prevalent magnetars such as SGR J1935+2154 are within FRB progenitors. We conducted a long monitoring on a sample of 7 star-forming nearby galaxies (< 12 Mpc). We do not report any FRB candidate coming from the selected galaxies, allowing us to place stringent upper limits on the event rate per magnetar.

We also exploit the Northern Cross in a long multiwavelength monitoring of FRB 20220912A, one of the most active repeaters known. During 6 months of observations, we report 16 new bursts from the source at 408 MHz. We show that the burst energy distribution resembles the one of another hyperactive repeater, hinting for a similar emission mechanism. We also report no detections at 1.4 GHz from observations conducted with the Medicina 32-m single dish. We find that FRB 20220912A has shown a decline of 4 orders of magnitude in its bursting activity at 1.4 GHz over a one year time scale compared to literature observations, while remaining active at 408 MHz.

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