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PINPOINTING FAST RADIO BURSTS IN SPACE AND TIME

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In the past decade we have started to explore extragalactic and intergalactic space using millisecond-duration radio flashes called 'fast radio bursts' (FRBs). These cosmological signals are surprisingly abundant: there is likely an FRB occurring somewhere on the sky at least once every minute. They are also unique probes of the otherwise invisible material between stars and galaxies. But what is producing them? Thanks to a new generation of wide-field radio telescopes, several FRBs per day are now being discovered. Novel high-time-resolution observations using radio interferometers are also pinpointing FRB locations and providing host galaxy associations. More than a decade since the discovery of the famous 'Lorimer burst', we are making rapid progress in our understanding of the enigmatic FRB phenomenon. In this talk, I will give my personal (observably biased!) view of the status of the field and then focus on how observations with the European VLBI Network (EVN), the Low-Frequency Array (LOFAR), the Green Bank Telescope, and the Nançay Radio Telescope are shedding light on the nature of FRB sources. These observations have provided broadband characterisation, milli-arcsecond localisations and nanosecond-resolution polarimetry to help decode the FRB source model and emission mechanism. At the same time, recent discoveries are showing us that we have still only scratched the surface in terms of the vast parameter space we can potentially explore. Expanding our exploration to an even wider range of timescales, luminosities and event-rates will allow us to discover new types of extreme astrophysical phenomena.