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# Study of ICME by spacecraft radio signals

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Tracking radio communication signals from planetary spacecraft with ground-based telescopes offers, among others, the possibility to study the electron density and the interplanetary scintillation of the solar wind. Observations of the telemetry link of spacecraft have been conducted regularly with ground antennae from the European Very Long Baseline Interferometry Network (EVN), aiming to characterize the propagation of radio signals in the solar wind at different solar elongations and distances from the Sun. We have detected and studies the Mars Express spacecraft radio signal phase fluctuations while, based on a 3-D heliosphere plasma simulation, an interplanetary coronal mass ejection (ICME) crossed the radio path during one of our observations on 6 April 2015. Our measurements showed that the Doppler measurements and phase scintillation indices increased by a factor of 4 during the passage of the ICME. The method presented here confirms that the phase scintillation technique based on spacecraft signals provides information of the properties and propagation of the ICMEs in the heliosphere and can be used to detect and monitor the presence of ICMEs in the near future.