Encoding many channels in the same frequency through radio vorticity: first experimental test

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We have shown experimentally that it is possible to propagate and use the properties of twisted non-monochromatic incoherent radio waves to simultaneously transmit to infinity more radio channels on the same frequency band by encoding them in different orbital angular momentum states. This novel radio technique allows the implementation of, at least in principle, an infinite number of channels on one and the same frequency, even without using polarization or dense coding techniques. An optimal combination of all these physical properties and techniques represents a solution for the problem of radio band congestion. Our experimental findings show that the vorticity of each twisted electromagnetic wave is preserved after the propagation, paving the way for entirely new paradigms in radio communication protocols.

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