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The nebular origin of the persistent radio emission of FRB

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Fast Radio Bursts (FRBs) are millisecond-duration, bright extragalactic bursts, whose production mechanism is still unclear. Recently, a persistent radio source (PRS) of non-thermal origin was discovered to be physically associated to two of the repeating FRB sources. These two sources have unusually large Rotation Measure (RM) values, likely tracing a dense magneto-ionic medium, consistent with a synchrotron radiation originating from a nebula surrounding the FRB source. Recent theoretical arguments predict that, if the observed RM mostly arises from the PRS region, there should be a simple relation between the luminosity of the PRS and the RM. We recently reported the detection of a third, less luminous PRS associated with the nearby FRB20201124A, significantly expanding the predicted relation into the low luminosity – low RM regime (<1000 rad/m²). These findings support the idea that the PRS is generated by a nebula in the FRB environment, and that most FRBs do not show a PRS because of a weaker magneto-ionic medium.

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