On the bound states of magnetic Laplacians on wedges

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This note is mainly inspired by the conjecture about the existence of bound states for magnetic Neumann Laplacians on planar wedges of any aperture $\phi \in (0, \pi)$. So far, a proof was only obtained for the apertures $\phi \leq \pi/2$. The conviction in the validity of this conjecture for the apertures $\phi \in (\pi/2, \pi)$ mainly relied on numerical computations. In this note we succeed to prove existence of bound states for any aperture $\phi \lesssim 0.509\pi$ using a variational argument with suitably chosen test functions. Employing some more involved test functions and combining a variational argument with numerical optimisation, we extend this interval up to any aperture $\phi \lesssim 0.595\pi$. Moreover, we analyse the same question for closely related problems concerning magnetic Robin Laplacians on wedges and for magnetic Schrödinger operators in the plane with δ-interactions supported on broken lines.