Magnetic winds in resistive compact binary discs

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Dwarf Novæ and low-mass X-ray binaries are eruptive binary systems comprised of a Roche-lobe overflowing solar-type star and an accreting compact object. Their recurrence time can be explained by a low-accreting phase, the quiescence, during which the angular momentum transport parameter is inferred to be $\alpha \approx 0.01$ by the Disc Instability Model. Non-magnetics mechanisms, such as spiral wave transport, only achieve angular momentum transport an order of magnitude too low, at best, because these discs are so thin in quiescence. During this phase, the Magneto-rotational Instability is known to be suppressed by the increased resistivity of the little ionised plasma. Studying these thin magnetised discs is a numerical challenge because of the wide separation in scales requiring to be resolved.
Thanks to the GPU-accelerated code Idefix, I produce global 3D MHD simulations of very thin disc ($H/R = 0.01$) for the first time. I explore the possibility that an MHD wind arises and increases accretion in low magnetic Reynolds number ($Rm \approx 100$) and realistic plasma parameter ($\beta \approx 1000$) regimes. We observe that the MRI is only quenched in the resistive disc bulk but survives in the disc atmosphere. This drives strong accretion and wind launching. I quantify the efficiency of the arising wind and measure its global effect on the disc. I explore the effect of the initial disc magnetisation and compare the the accretion/ejection regime with and without resistivity.