Jeudi 21 avril 2022 à 11h (IAS, bâtiment 121, salle 1-2-3)

Heating of the solar atmosphere by transverse waves

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The outermost layer of the solar atmosphere, the corona, is composed of plasma which is hotter than the surface by several orders of magnitude. One of the main challenges in solar physics is to explain how the corona is formed and heated to temperatures of several million degrees. A candidate mechanism is that magnetohydrodynamic (MHD) wave are excited by convective motion inside the star. These waves then transport and deposit energy into the corona. Within this model, transverse oscillations are ubiquitously observed in the solar atmosphere. Numerical simulations predict that these transverse waves could efficiently heat the corona through the Kelvin-Helmholtz instability. However, analytical works predict a low-frequency cutoff for these waves in the lower atmosphere. It is thus still unclear how they can reach the corona.
Using 3D MHD simulations, I studied how transverse waves propagate through the lower atmosphere into the corona. I showed that most transverse waves can reach the corona, despite the cutoff in the lower atmosphere. I characterized the frequency dependency of the cutoff, and compared it to the prediction of different numerical models. Finally, I simulated an entire coronal loop embedded. This simulation shows that transverse waves travelling from the lower atmosphere can indeed heat the loop.