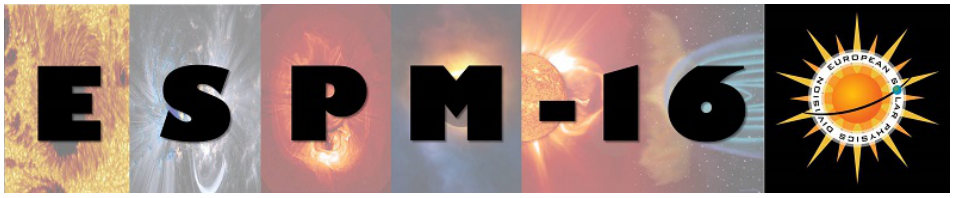

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Can we estimate coronal wave energies using synthetic non-thermal line widths from MHD simulations?

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Estimates of coronal wave energies remain uncertain as a large fraction is hidden in the non-thermal line widths of emission lines. To estimate these wave energies, previous studies have taken the root mean squared wave amplitudes to be a factor of $\sqrt{2}$ greater than the non-thermal line widths. However, other studies have used different factors. To investigate this discrepancy, we consider the relation between wave amplitudes and the non-thermal line widths within a variety of 3D magnetohydrodynamic (MHD) simulations. To generate the synthetic emission required to analyse the non-thermal line widths, the forward modelling code FoMo is used. In order to estimate wave energies, an appropriate relation between the non-thermal line widths and root mean squared wave amplitudes must be found. However, evaluating this ratio to be a singular value, or even providing a lower or upper bound on it, is not realistically possible given the sensitivity it has to various MHD models. It depends on a variety of factors, including line-of-sight angles, velocity magnitudes, wave interference and exposure time. Indeed, some of our models achieved the ratios claimed in recent articles while other more complex models deviated from these values. As the ratio between wave amplitudes and non-thermal line widths is not constant across our models, this widely used method for estimating wave energy is not robust.

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