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What is the link between low magnetic field compressibility and 1/f range of turbulent spectra in the fast solar wind?

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A puzzling property of fast solar wind magnetic fluctuations is that, despite their large amplitude, they induce little variations in the strength of the magnetic field, thus maintaining a low level of compressibility in the plasma.
At the same time, in addition to the well-known Kolmogorov MHD inertial range spectrum with slope -5/3, larger scales of fast streams are characterised by a shallower slope, close to -1. This 1/f range is considered the energy reservoir feeding the turbulent cascade at smaller scales, although its origin is not well understood yet.
These aspects are usually addressed as separate properties, however, we suggest that a link between the two exists and we propose a phenomenological model in which a 1/f spectrum for large scales can be derived as a consequence of the low magnetic compressibility condition. Remarkably this model, although simple, can capture most of the variability observed in situ in the solar wind and explain spectral differences in wind regimes. Moreover, our model provides a prediction for the evolution of the 1/f range close to the Sun that it will be possible to test soon thanks to the forthcoming observations of Parker Solar Probe.