An iterative destriping technique for diffuse background polarization data

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We describe a simple but effective iterative procedure specifically designed to destripe \( Q \) and \( U \) Stokes parameter data as those collected by the SPOrt experiment onboard the International Space Station (ISS). The method is general enough to be useful for other experiments, both in polarization and total intensity. The only requirement for the algorithm to work properly is that the receiver knee frequency must be lower than the signal modulation frequency, corresponding in our case to the ISS orbit period. Detailed performances of the technique are presented in the context of the SPOrt experiment, both in terms of added rms noise and residual correlated noise.

cosmic microwave background – Polarization – Cosmology: observations – Methods: data analysis – Methods: numerical

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Introduction Low frequency noise is known to affect all radiometers and to induce correlations among successive samples of the measured signal, leading to typical striping effects when producing sky maps. It is characterised by a power-law spectrum \( S(f) \propto (1/f)^\beta \), with \( \beta \) roughly in the range 1 \( \div \) 2.5 depending on the noise source. The total instrumental noise power spectrum is usually specified in terms of the knee frequency, \( f_k \), at which the white and low frequency components of the noise are equal: equation

\[
S(f) = \sigma_0^2 \left[ 1 + (f_k f)^\beta \right] eq : noiseps
\]