VIRGO Science Proposal E3
Properties of solar noise in irradiance and radiance

Main Investigator

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Co-Investigators

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Objectives

Use the properties of the intermode background signal between approximately 150μHz and 8 mHz to make a model of the underlying noise producing mechanisms. This model will be used in an attempt to describe noise properties in the region 50μHz-150μHz, where the disentangelment of solar noise and g-modes will be difficult.

Scientific rationale

The solar background "noise" signal is of interest for the main VIRGO scientific objectives because this noise signal will be the major obstacle for the detection and classification of the solar g-modes. An understanding of the nature of the noise signal may increase the detection probability of the g-modes. The global signature of small scale and relatively short lived solar surface structures will be a valuable input in the understanding of the of the asteroseismic observations, i.e. STARS. The modelling of the global noise signatures may enable us to deduce information about similar phenomena on other stars from high resolution measurements with STARS.

Work plan

The work will be divided into to main areas. Firstly the overall lower limit of the power spectra will be determined and compared with previous measurements an models, changes in gradient will be looked for which may indicate variation in the origin of the noise sources. Secondly a more elaborate program to look at the details of the noise signal. This will include: Remove the effects of known p-modes and use predictions of frequencies of the lowest n p-modes to exclude these regions from the analysis. Create noise time series from the cleaned data for the radiometer data, for each of the SPMs and LOI pixels. Study the time series to investigate differences in the noise spectra as function of wavelength and solar position. Attempt to use linear and non-linear predictors to model the noise structure. The knowledge of the surface structure lifetimes, spatial distribution and contrasts will be used to limit the parameter space. Extrapolate the model to lower frequencies in a stepwise manner and compare the predictions with the observations

Problem areas

The lifetimes and detailed properties of the noise sources are not known and may overlap with the oscillations None of the investigators have very good understanding of the mathematics needed.

Responsibilities

The instrument CoIs will provide the Level1/Level2 timeseries. B. Andersen will carry out the main study on the modelling of surface structure parameters. T. Leifsen will create the calculations of the noise predictors.