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Radiometric STFT Analysis of PDV recordings and detectivity limit OLIVIER BOZIER, GABRIEL PRUDHOMME, PATRICK MERCIER, CEA DAM DIF, LAURENT BERTHE, PIMM, UMR 8006 CNRS-Arts et Métiers ParisTech — Photonic Doppler Velocimetry is a plug-and-play and versatile diagnostic used in dynamic physic experiments to measure velocities. When signals are analyzed using a Short-Time Fourier Transform, multiple velocities can be distinguished: by example, the velocities of moving particle-cloud appear on spectrograms. In order to estimate the back-scattering fluxes of target, we propose an original approach "PDV Radiometric analysis" resulting in an expression of time-velocity spectrograms coded in power units. Experiments involving micron-sized particles raise the issue of detection limit; particle-size limit is very difficult to evaluate. From the quantification of noise sources, we derivate an estimation of the spectrogram noise leading to a detectivity limit. It may be compared to back-scattering and collected power from a particle, which is increasing with its size. At least, some results from laser-shock accelerated particles using two different PDV systems are compared: it may show the improvement of sensitivity.

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