Active Membrane-Quake Detection in Red Blood Cells by Back Focal Plane Interferometry

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Fluctuations of the red blood cell membrane exhibit both thermal and active components [1,2]. For a better detection of these fluctuations, we use our custom designed microscope with the back focal plane interferometry, a simple yet very powerful optical technique for nanometric displacement observation [3]. Combining it with the wavelet analysis, we reveal single events, membrane-quakes, in the thermal background of the fluctuations. These events can be identified as active and are related to the single protein binding and unbinding processes within the cytoskeletal scaffold, and therefore to the ATP-consumption [2]. The use of the visually more adapted wavelet transform unveils both time and frequency information about the membrane activity, while the classical power spectral density analysis complements it with the physical parameters of the system. We present our preliminary results of the red blood cell membrane activity in the normal and ATP-depleted conditions.

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