

Abstract Submitted  
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**Observation of a single particle diffusive motion on the membrane by 3-dimensional particle tracking microscope.** SEUNGYONG YOU, JING YUAN, DAVID VAN WINKLE, Department of Physics and Center for Materials Research and Technology, The Florida State University, Tallahassee, FL, THOMAS FISCHER, Institution for Experimental Physics V, University of Bayreuth, Bayreuth, Germany — Three-dimensional motion of particles on the surface of giant vesicle membranes has been tracked with nanometer scale resolution using a quadrant photodiode, which is used as a position sensitive detector (PSD), placed in the diffraction pattern formed behind a 100x microscopic objective. Two He-Ne beams were focused to trap a single particle in solution between cover slips with 100 micro-meter gap. The single particle is brought very close to the surface of a membrane system by optical tweezer. By reducing the optical power, the particle sits on the membrane surface and moves diffusively. The diffusing motion is measured using a fast-feedback controller designed to respond to the axial and the lateral position of the particle simultaneously in less than 250 micro-seconds. This work has better positional and temporal accuracy of 3-dimensional particle tracking than conventional video-tracking methods.

Seung  
Department of Physics and Center for Materials Research and Technology, The Florida State University, Tallahassee, FL

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