SPEAKER: Sergii Vasiukov

TITLE: **A novel method to perform plenoptic imaging at the diffraction limit**

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ABSTRACT

Fast, high-resolution, and low-noise 3D imaging is highly required in the most diverse fields, from space imaging to microscopy, security, industrial inspection, machine vision, etc. A possible way to reconstruct a 3D scene is through plenoptic imaging, which gives the acquisition of both spatial and angular distribution of light coming from a certain scene. A novel method to perform plenoptic imaging at the diffraction limit by measuring second-order correlations of light between two reference planes, arbitrarily chosen, within the tridimensional scene of interest will be discussed. The working principle of the correlation plenoptic imaging, the experimental method, and first promising results will be shown. In the case of chaotic light illumination, the approach enables to increase 10 times the depth of field in comparison with standard imaging, while the resolution is kept at the diffraction limit. Also, the features of design and creation of the single-lens camera prototype based on a single-photon avalanche diode array (512 x 256 pixels) with a high frame rate (up to 100 kfps) will be shown. The discussed principles will allow expanding and supplementing research methods in particle physics, for example. One of the promising applications is a 3D reconstruction of particle tracks in a target.

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