# Correlation imaging, from 3D to hyper spectral

Milena D'Angelo[1,2], Gianlorenzo Massaro[1,2], Davide Giannella[1,2], Rosa Vaira[1,2], Sergio de Gioia[1,2], Giuseppe Lerario[1], Shih_Xian Yang[1]

[1]*Università degli Studi di Bari*

[2]*INFN sez. Bari*

We shall present recent advances in correlation imaging modalities enabling scanning-free high-resolution hyperspectral imaging, 3D imaging and 3D microscopy, with at least one order of magnitude advantage over typical tradeoffs such as resolution versus depth of field and spatial versus spectral resolution. Both entangled light beams and chaotic light are employed, depending on the specific application scenario. Speed-up enabled by both SPAD arrays and AI denoising approaches are presented, demonstrating the effective capability of the presented approaches to compete with state of the art approaches, while overcoming their intrinsic limitations.