



Einladung zum Vortrag

Metabolism Imaging via Quantum Entanglement

von

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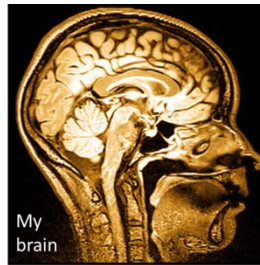
Termin: Dienstag, 05.12.2017, 13:00 Uhr

Ort: Erwin-Schrödinger-Hörsaal

9. Boltzmannngasse 5/Strudlhofgasse 4, 5.Stock

Abstract:

The detection of the two high energetic photons coming from the annihilation of an electron and a positron is a well-established successful technology to image metabolic processes in living bodies (PET: Positron Emission Tomography). During such a scan positronium atoms are formed which can as well decay into three photons. Due to technical limitations such events have never been registered, however, a new technology, the J-PET device, will change that [1]. Theoretical computations [2] show that surprisingly, even genuine multipartite entangled, entanglement survives. Observing the



the above picture, for any pixel one would also gain quantum information which may equip us with details on the microscopic scale and possibly some quantum biological markers.

Moreover, recent research on photons entangled in their angular momentum or/and polarisation degrees of freedom will be presented [3]. This research line will open the possibility to exploit higher dimensions and multipartite systems for formidable quantum technologies.

[1] e.g.: D. Kamińska, et al., *A feasibility study of ortho-positronium decays measurement with the J-PET scanner based on plastic scintillators*, Eur. Phys. J. C 76, 445 (2016)

[2] B.C. Hiesmayr and P. Moskal, *Genuine Multipartite Entanglement in the 3-Photon Decay of Positronium*, Scientific Reports 7, 15349 (2017).

[3] e.g.: B.C. Hiesmayr, M.J.A. de Dood and W. Löffler, *Four-photon orbital angular momentum entanglement*, Phys. Rev. Lett. 116, 073601 (2016); G. Carvacho, F. Graffitti, V. D'Ambrosio, B. C. Hiesmayr and F. Sciarrino, *Experimental investigation on the geometry of GHZ states*, Scientific Reports 7, 13265 (2017).