PHYSICS COLLOQUIUM

“Strong interactions between individual photons”

Photons are ideal carriers of quantum states but the stored information is difficult to process because photons in vacuum do not interact with one another. I will present some recent experimental results on generating interactions between individual photons traveling slowly through an atomic gas, and explain how photons can be made to travel at speeds much less than that of light in vacuum, or even stored for seconds. Strong interactions between two photons are induced by coupling them to strongly interacting, highly excited atomic states. These so-called Rydberg states are also being used by Prof. Serge Haroche who was awarded this year’s Nobel Prize in physics.

Vladan Vuletic was born in Serbia and received his undergraduate (1992) and Ph.D. degrees (1997) from the University of Munich in Germany working with Prof. Ted Haensch on atom trapping. Subsequently he accepted a Lynen Postdoctoral Fellowship at Stanford University in 1997 to work with Prof. Steven Chu on laser cooling and ultracold atomic collisions. In 2000, he was appointed an Assistant Professor in the Department of Physics at Stanford and in June 2003 accepted an Assistant Professorship in Physics at MIT. He was promoted to Associate Professor in July 2004, and to Full Professor in July 2011. Awards include a 2003 Alfred P. Sloan Research Fellowship and an APS Fellowship in 2013. His research interests include quantum optics, quantum information processing, ultracold temperatures, and the fundamentals of quantum mechanics.