Philippe W Courteille (IFSC-USP, Brazil): *Introductory course (atom-light interaction and basic applications)*

Cold atomic clouds represent an ideal platform for studies of basic phenomena of light-matter interaction. The invention of powerful techniques for cooling and trapping atoms led to an unprecedented experimental control over all relevant degrees of freedom to a point where the interaction is dominated by weak quantum effects. This course reviews the foundations of this area of physics, emphasizing the role of light forces on the atomic motion. Collective and self-organization phenomena arising from a cooperative reaction of many atoms to incident light will be discussed.

References:

H.J. Metcalf, P. van der Straten, Laser Cooling and Trapping, (Graduate Texts in Contemporary Physics, Springer, 1999)

J. Weiner and P-T. Ho, Light-Matter Interaction: Fundamentals and Applications (Springer-Verlag, Berlin, 2003)

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R. Loudon, The quantum theory of light (Oxford Science Publications, Oxford, 1973)
Ch.J. Foot, Atomic physics, (Oxford Master Series in Atomic, Optical and Laser Physics, 2005)