Enrico Salvadori

Chemistry Department, University of Torino

Room-Temperature Coherent Microwave Amplification

Thursday 17 December, 4:00 pm

Webex online event

https://unito.webex.com/unito/j.php?MTID=mebf595cfe431cad7e1c0c39a29d1ae33
(short link: https://tinyurl.com/y6e23za3)
event #: 121 600 8994
password: maser2020

contatti: Mario Chiesa (mario.chiesa@unito.it)
Paolo Olivero (paolo.olivero@unito.it)

Abstract

The acronym LASER stands for Light Amplification by Stimulated Emission of Radiation and refers to a wide variety of systems that relay on the principle of stimulated emission to produce intense beams of light. LASERs are nowadays ubiquitous devices used for a range of applications, from CD players to precision-welding, to eye surgery. If a device amplifies microwaves instead of visible light is called a MASER. MASERs were invented before LASERs but never found widespread application due to taxing operating conditions, such as the need of cryogenic temperatures and high applied magnetic fields. This talk will review the efforts made to "bring MASERs out of the cold" and to operate (when possible) in the earth's magnetic field. Two classes of gain media will be discussed: organic chromophores embedded in an inert matrix [1,2] and spin defects in inorganic materials [3]. Advantages, disadvantages and open questions related to each class will be highlighted.

[1] Oxborrow, M., Breeze, J. & Alford, N. Room-temperature solid-state maser. Nature 488, 353–356 (2012).

[2] Salvadori, E., Breeze, J., Tan, KJ. et al. Nanosecond time-resolved characterization of a pentacene-based room-temperature MASER. Sci Rep 7, 41836 (2017).

[3] Breeze, J., Salvadori, E., Sathian, J. et al. Continuous-wave room-temperature diamond maser. Nature 555, 493–496 (2018).

The speaker

Enrico Salvadori obtained his PhD in Chemical Sciences at University of Padova in 2011. He then moved to London (UK) where he spent almost 8 years working for various institutions, notably The Royal Institution of Great Britain, University College London (UCL) and Queen Mary University of London (QMUL). As of December 2018 he is assistant professor of General and Inorganic Chemistry at the University of Turin. His research interests include photoexcited paramagnetic states, energy transfer, organic photovoltaics and coherent microwave amplification exploiting high spin states.