Colloque n° ?? **X Oral** **□ Poster**

Theory of collective cavity dynamics for cold chemistry and materials science

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Strong light-matter interactions are playing an increasingly crucial role in the understanding and engineering of new states of matter with relevance to the fields of quantum optics, solid state physics, chemistry and materials science. In this talk we focus on collective light matter interactions in the limit of vanishingly small photon numbers: Coupling matter to the vacuum electromagnetic field of a cavity – i.e. passively – can lead to permanent changes in the material due to the combined effects of vacuum hybridization, long-range cavity-mediated and direct couplings between material constituents. Examples of modified properties of strongly coupled systems, such as charge and energy transport, and chemical reactivity will be given to illustrate the potential of polaritonic states for molecular and material sciences.