



Venerdì 15 settembre 2023 alle ore 14:30 presso l'aula L2

il **Dr. Christian Schäfer**

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terrà il seminario dal titolo:

## **Ab initio QED: Correlated light-matter states from first principles and their use for spectroscopy, chirality, and chemistry**

The alchemical dream of altering a given material on demand is at the heart of chemistry and material science. Confining optical or plasmonic modes results in a strong increase in light-matter coupling and leads to the creation of hybrid light-matter states. Control over the electromagnetic confinement allows, therefore, to non-intrusively control the correlated eigenstates, resulting in modified material dynamics, and its chemistry. We will start with a brief introduction to the emergent field of ab initio QED [1,7], illustrating an intuitive shortcut for the description of self-consistent light-matter interaction [2]. We will subsequently investigate how chemical reactions can be controlled, shining light on the microscopic mechanism behind vibrational strong coupling [3,4,7]. Lastly, we discuss the consequences of breaking chiral symmetry with specifically designed electromagnetic environments, which paves the way for a new direction in chiral recognition [5,6,7].

[1] C. Schäfer, F. Buchholz, M. Penz, M. Ruggenthaler, and A. Rubio, PNAS 2021 Vol. 118 No. 41 e2110464118.

[2] C. Schäfer and G. Johansson, PRL 128, 156402, (2022).

[3] C. Schäfer, J. Flick, E. Ronca, P. Narang, and A. Rubio, Nature Communications, (2022) 13:7817.

[4] C. Schäfer, Phys. Chem. Lett. 2022, 13, 30, 6905-6911.

[5] C. Schäfer, D. Baranov, J. Phys. Chem. Lett. 2023, 14, 15, 3777-3784.

[6] D. Baranov, C. Schäfer, M. Gorkunov, ACS Photonics 2023, 10, 8, 2440-2455.

[7] In progress.

*La presenza della S. V. sarà molto gradita*

*Stefano Corni*

**Il Direttore del Dipartimento**  
*Michele Maggini*