

Welcome



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UNIVERSITÀ
DEGLI STUDI
DI PADOVA

**Il Dipartimento di Scienze Chimiche accoglie
Gabriele Stevanato
che terrà un seminario dal titolo:**

**Hyperpolarized Magnetic Resonance for Biological
applications**

**Martedì 21 marzo 2023, ore 17.15 Aula H, Dipartimento di Scienze
Chimiche, Via Marzolo, 1.**

Dysregulation of the energy production inside the cell is a characteristic trait of numerous ominous diseases. Pyruvate, the simplest alpha keto-acid, is the terminal product of glycolysis and plays a pivotal role in the cellular energy production. In numerous forms of cancer (K), neurodegenerative diseases and heart failure, pyruvate metabolism is highly upregulated. Nuclear Magnetic Resonance (NMR), an analytical technique yielding atomic level information, is an ideal tool to detect signals from small molecules like pyruvate. However, the sensitivity is low and in order to be effective NMR must be combined with other methods called hyperpolarization methods (HM) that can amplify the nuclear signal several thousand-fold. The most successful HM at the moment, called dynamic nuclear polarization, necessitates fairly expensive equipment (~2.5 M), high technical expertise, and a lengthy experimental period.

Following a brief introduction on the various HMs I worked with, I will present a method based on parahydrogen induced polarization side arm hydrogenation (PHIP-SAH) in which the pyruvate signal is increased several thousand fold in biocompatible solutions in seconds and at only 1% of the cost of DNP while still yielding relevant metabolic information. Finally, I will introduce a variant of the PHIP method called Signal Amplification By Reversible Exchange (SABRE), which holds the potential to increase the applicability of metabolites hyperpolarization with no need of complex chemical synthesis.

Il Direttore del Dipartimento
Michele Maggini