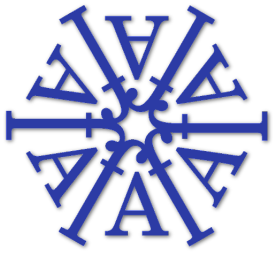
106° Reunión de la Asociación Física Argentina

Segunda Webinar



12 al 15 de octubre de 2021

Índice general

Selective microstructure-size filters for non-invasive quantitative imaging by magnetic resonance

• Analía Zwick,[1,2] Milena Capiglioni,[3] Pablo Jimenez,[3] Gonzalo A. Alvarez[1,2,3]

[1] *Instituto de Nanociencia y Nanotecnología, CONICET–CNEA, Centro Atómico Bariloche*
[2] *Centro Atómico Bariloche - CONICET, Comisión Nacional de Energía Atómica*
[3] *Instituto Balseiro - Universidad Nacional de Cuyo*

Extracting quantitative microstructure information of living tissue by non-invasive imaging is an outstanding challenge for understanding disease mechanisms and allowing early stage diagnosis of pathologies. Magnetic Resonance Imaging (MRI) is a promising and widely used technique to pursue this goal, but still provides low resolution to reveal microstructure details [1]. We here report on a method to produce images of filtered microstructure-sizes based on selective probing of nuclear-spin dephasing induced by the molecular diffusion within specific tissue-compartments [2]. The microstructure-size filter relies on suitable dynamical control of nuclear spins that sense magnetization decay-shifts rather than the commonly used spin-echo decay-rates. The feasibility and performance of the method are illustrated with proof-of-principle experiments and simulations on typical size-distributions of white-matter in the mouse brain [3]. These results show that spin-echo decay-shifts can be a new MRI paradigm to advance towards unravelling diagnostic information based on microstructure parameters that characterize biological tissues.

Referencias:
[1] A. Zwick, D. Suter, G. Kurizki, and G. A. Álvarez, Phys. Rev. Applied **14**, 024088, (2020).
[2] M. Capiglioni, A. Zwick, P. Jiménez, and G. A. Álvarez. Proc. Intl. Soc. Mag. Reson. Med. **29**, 2036 (2021).
[3] M. Capiglioni, A. Zwick, P. Jiménez, and G. A. Álvarez, Phys. Rev. Applied **15**, 014045 (2021).