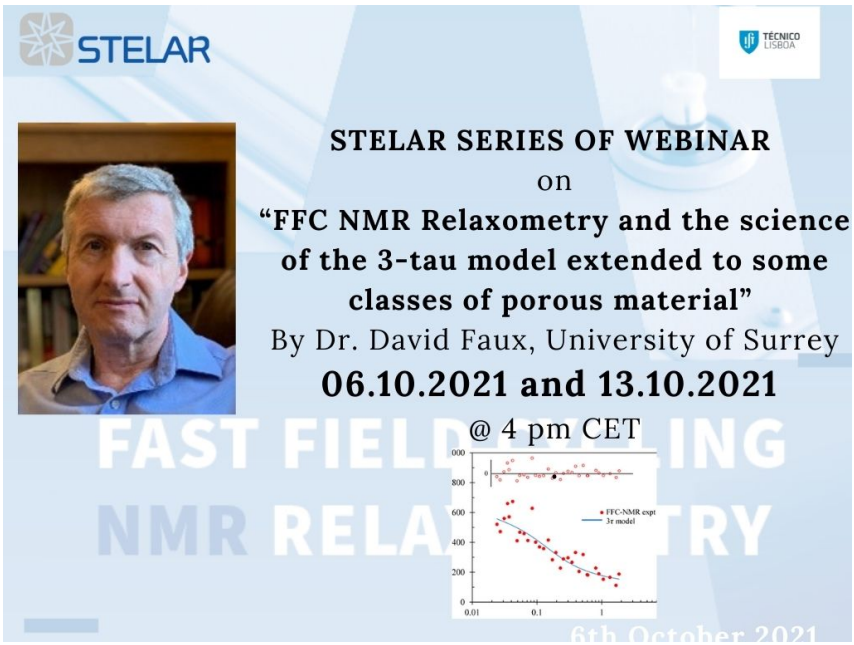

Dr. David Faux, University of Surrey

Title

The science of the 3-tau model

Abstract

The 3τ model allows interpretation of fast-field-cycling nuclear magnetic resonance measurements from certain types of fluid-filled porous materials. Materials accessible to the 3τ model includes hydrocarbon rocks, silicates and glasses, plasters, cementitious material, clays, catalysts, and cheese. Fits to FFC-NMR dispersion curves using the 3τ model yields five material properties, plus additional related physical quantities such as an average pore size and T1/T2.

In the first webinar, the science underpinning the 3τ model is described and explained. Its limitations, strengths and weaknesses are critically appraised. The ambitions for extending the 3τ model to some classes of porous material (such as bio-materials, lipid systems, certain foodstuffs) where the solid is free of paramagnetic ions but contains proton spins described.

The second webinar will commence with a brief overview of the two classes of material accessible to the 3τ model: systems with or without paramagnetic ions in the solid. This will be followed by an informal demonstration of some new software which allows the user to fit the 3τ model to experimental data. The interface will be described followed by some demonstration fits. Ample time throughout will be set aside for questions and queries. Plans for supporting the user community going forward will be discussed.

Biography

David works as a theorist and computational modeller at the University of Surrey, Guildford, UK, focussing on porous material and particle suspensions. Simulation techniques include molecular dynamics simulation. David has applied theory and modelling to the interpretation of NMR relaxation measurements in porous materials, ultimately leading to his 3τ model which allows a broad range of dynamical and structural parameters to be obtained from experimental dispersion curves produced by fast-field-cycling NMR relaxometry experiments on a wide range of porous material, including nano-materials. Other work involves the interpretation of FFC-NMR dispersion curves from aqueous ion solutions and a new theory that provides an estimate of the intra-molecular contribution to the relaxation rates in pure water.