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## **Fast kinetics in thin films by intensity modulated neutron reflectometry**

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We propose a method for kinetic neutron reflectometry with a time resolution of a few  $\mu\text{s}$ . The method is based on periodic excitation of the sample and phase locked modulation of the beam intensity by one radio frequency spin flipper, and requires a position sensitive neutron detector with time resolution also in the order of 1  $\mu\text{s}$ . The output are time resolved reflectivity curves locked to the phase of the sample excitation parameter. The method is compatible with polarization analysis and off-specular scattering. Thus, lateral and depth resolved chemical and magnetic SLD (scattering length density) profiles can be measured with the aforementioned time resolution. Future applications are, for example, the study of spintronic thin film devices based on implanted hydrogen, where small shifts of the hydrogen concentration profiles induced by a gating voltage can dramatically effect magnetic, electric, and superconducting properties.

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