ICANS XX,
20th meeting on Collaboration of Advanced Neutron Sources
March 4 – 9, 2012
Bariloche, Argentina

Design study of imaging instrument optimised for long pulse spallation neutron source

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Abstract

The conceptual design of an imaging instruemt at ESS needs to suite a number of novel methods that take advantage of the pulsed nature of the source in order to benefit substantially. These methods convey, besides conventional attenuation contrast imaging, time-of-flight imaging at Bragg-edges, quantitative magnetic tomography, phase-contrast and dark-field contrast imaging, The concept for a corresponding instrument foresees a length of up to 60m for the baseline parameters of 14Hz and 2.86ms pulses at ESS and hence requires a guide system as well as a flexible chopper system that enables various wavelength resolutions. Here we present the state of numerical simulations in order to optimize a corresponding guide system that meets the requirements of the chopper system and to deliver an intense and divergent beam producing a homogeneously irradiated large field of view (25x25cm^2) for imaging in pinhole geometry. Additionally, preliminary results of a more detailed study of potential versatile chopper set-ups for wavelength-frame multiplication allowing for flexible resolution will be presented.