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A Wide Aperture Superconducting Vector Magnet for photon beamlines: WAVE Photons

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A 1 T Wide Aperture Vector magnet, WAVE Photons, dedicated to the soft x-ray experiment resonant scattering (SEXTANTS) beamline at Synchrotron SOLEIL, is developed by CEA, SOLEIL, Institut Néel and the Company SIGMAPHI. The scientists study electronic and magnetic properties under applied magnetic field using different techniques such as Resonant Inelastic X-ray Scattering (RIXS), X-Ray Magnetic Resonant Scattering (XRMS), Coherent X-ray Imaging (CXI) and Fourier Transform Holography (FTH). New research will be led with the superconducting 1 T 3D WAVE photons magnet. It features a wide 200° horizontal aperture and a wide 10° vertical aperture. It offers a 60 mm vertical aperture and a 30 mm high side access for samples. WAVE photons is compatible with the existing experimental instruments and with the ultra-high vacuum of the experimental end-station. Based on an innovative design (patent FR12 62 070, US extension 14/105,711 and patent BD17525SG), WAVE photons has 16 NbTi solenoids, all with vertical axis, imbedded in an aluminum box and dry-cooled by two cryocoolers. The vertical field is produced by four flat coils (two coils in quasi Helmholtz position and two coils for active shielding), while the horizontal field is generated by 3 sets of 4 coils each, two above and two below the beam plane connected in an antisymmetric way. The WAVE coils are energized by four Current Supplies through HTS current leads. The magnet will be commissioned in 2018. This work is supported by the ANR Contract ANR-16-CE09-0009.

Submitters Country

France

Primary author: Dr MADUR, Arnaud (CEA Saclay)

Co-authors: Dr JAOUEN, Nicolas (Synchrotron SOLEIL); Dr BATAILLE, Alexandre (CEA Saclay); Dr TONNERRE, Jean-Marc (Institut Néel); Mr FOREST, Frederick (Sigmaphi); Mr LACIPIÈRE, Jérôme (Institut Néel); Prof. AUBERT, Guy (CEA Saclay); Mr DELBECQ, Morgan (Sigmaphi); Dr PASQUET, Raphaël (Sigmaphi); Mr GHELLER, Jean-Marc (CEA Saclay); Mr LAVIE, Pascal (CEA Saclay); Mr DAËL, Antoine (CEA Saclay)

Presenter: Dr MADUR, Arnaud (CEA Saclay)

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