

INTERNATIONAL WORKSHOP ON IMAGING
VARENNA (LAKE COMO), ITALY
26–29 SEPTEMBER 2023

Assessment of imaging performance for metal alloys of the first Italian neutron imaging beamline NICHE (Pavia, Italy)

L. Vigorelli^{a,b,*} G. Marcucci^{a,c} D. Di Martino^a M. Clemenza^a F. Grazzi^{d,e} F. Cantini^{d,e,f} N. Gelli^e L. Giuntini^{e,f} F. Taccetti^e T.E. Bella^g O. Sans Planell^{h,i} M. Magaliniⁱ A. Reⁱ L. Guidorziⁱ M. Marabotto^{i,b} A. Lo Giudiceⁱ A. Vietti^b S. Grassini^b M.P. Morigi^j M. Bettuzzi^j D. Alloni^k M. Prata^k and A. Salvini^k

^aDipartimento di Fisica “G. Occhialini”, Università di Milano-Bicocca and INFN, Sezione di Milano-Bicocca, Milano, Italy

^bDipartimento di Scienze Applicate e Tecnologia, Politecnico di Torino and INFN, Sezione di Torino, Torino, Italy

^cSTFC ISIS Neutron and Muon Source, Didcot, United Kingdom

^dConsiglio Nazionale delle Ricerche, Istituto di Fisica Applicata “Nello Carrara”, Sesto Fiorentino, Italy

^eINFN, Sezione di Firenze, Sesto Fiorentino, Italy

^fDipartimento di Fisica e Astronomia, Università di Firenze, Firenze, Italy

^gIndependent Researcher

^hHelmholtz Centre Berlin for Materials and Energy, Berlin, Germany

ⁱDipartimento di Fisica, Università di Torino and INFN, Sezione di Torino, Torino, Italy

^jDipartimento di Fisica ed Astronomia “Augusto Righi”, Università di Bologna and INFN, Sezione di Bologna, Bologna, Italy

^kLaboratorio Energia Nucleare Applicata (LENA) and INFN, Sezione di Pavia, Pavia, Italy

E-mail: luisa.vigorelli@unimib.it

ABSTRACT: In this paper, the imaging capabilities and performance of the new neutron imaging beamline developed at the LENA facility of Pavia (Italy) in the framework of the NICHE project (Neutron Imaging in Cultural HEritage) are presented. For this purpose, the estimation of bronze and brass alloys attenuation coefficient has been obtained through imaging analysis of a set of Cu-based alloy reference samples produced ad-hoc with chemical composition similar to ancient artefacts. In addition, some samples were realised using a different cooling ramp in order to test the influence of the alloy production procedures in neutron attenuation. Moreover, the tomographic capabilities of the beamline were tested for different metallic and plastic materials.

KEYWORDS: Data analysis; Image processing; Neutron radiography

*Corresponding author.