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The new INFN-CHNet neutron imaging facility

N. Gelli^a, L. Giuntini^{a,b}, F. Cantini^{a,b,c}, O. Sans-Planell^{d,e}, M. Magalini^{d,e}, M. Manetti^a, L. Sodi^a, M. Massi^a, L. Castelli^a, C. Czelusniak^a, F. Taccetti^a, T.E. Bella^f, G. Marcucci^{g,h,i}, M. Clemenza^{g,h}, D. Di Martino^{g,h}, M. Morigi^{j,k}, M. Bettuzzi^{j,k}, L. Vigorelli^{d,e,l}, A. Re^{d,e}, A. Lo Giudice^{d,e}, D. Alloni^{m,n}, M. Prata^{m,n,p}, S. Altieri^{m,o}, A. Salvini^{m,n}, F. Grazzi^{a,c,*}

^a INFN Sezione di Firenze, Italy^b Dipartimento di Fisica e Astronomia, Università degli Studi di Firenze, Italy^c Consiglio Nazionale delle Ricerche, Istituto di Fisica Applicata "Nello Carrara", Sesto Fiorentino, Italy^d INFN, Sezione di Torino, Torino, Italy^e Dipartimento di Fisica, Università degli Studi di Torino, Italy^f Independent researcher^g INFN Sezione di Milano Bicocca, Milano, Italy^h Dipartimento di Fisica "G. Occhialini", Università di Milano Bicocca, Milano, Italyⁱ ISIS Facility, UKRI-STFC, Rutherford Appleton Laboratory, Didcot, UK^j INFN Sezione di Bologna, Italy^k Dipartimento di Fisica ed Astronomia "Augusto Righi", Università di Bologna, Italy^l Dipartimento di Elettronica e Telecomunicazioni, Politecnico di Torino, Italy^m INFN Sezione di Pavia, Italyⁿ Laboratorio Energia Nucleare Applicata (LENA), Pavia, Italy^o Dipartimento di Fisica, Università di Pavia, Italy^p European Commission, Joint Research Centre, Ispra (VA), Italy¹

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ABSTRACT

In this paper, NICHE (Neutron Imaging for Cultural HERitage), the new neutron imaging facility of the Italian National Institute of Nuclear Physics (INFN) is shortly presented. We report on the main features of the beamline, the specifications of the detection set-up, and the performances of the imaging system. NICHE is installed at the TRIGA reactor of LENA (Laboratorio Energia Nucleare Applicata) Pavia University laboratory (Italy). The imaging facility was designed during 2020, installed in the spring 2021, and has been in operation since May 2021. NICHE is the first Italian neutron imaging station open to national external users through the INFN-CHNet network application system. NICHE allows users to obtain neutron radiographies and tomographies, thus allowing for morphological characterisation of samples. First results to highlight the potential of the facility are reported. In particular, we show the first results about spatial resolution measurement and 3D reconstruction to provide morphological analysis capabilities.

1. Introduction

The Cultural Heritage Network INFN-CHNet is a research infrastructure, widespread all over Italy, of the Istituto Nazionale di Fisica Nucleare (INFN) dedicated to the development and the applications of analytical techniques to perform advanced diagnostic on materials and artefacts related to Cultural Heritage (CH) [1]. It is based on several research centres, both in Italy and abroad, where cutting-edge technologies are developed and optimised in order to address the needs of Cultural Heritage researchers, such as archaeologists, histo-

rians, art historians, restorers, and conservators, as regards diagnostic features [2].

Within CHNet, many complementary analytical techniques are available whose scientific output quality is continuously improved and upgraded. The use of different analysis and diagnostic technologies provides complementary information aiming at facilitating the application of the best practices for restoration/conservation. Analyses are also useful for characterising materials and manufacturing techniques, studying the provenance of the raw materials, and giving indications about material authenticity.

* Corresponding author at: Consiglio Nazionale delle Ricerche, Istituto di Fisica Applicata "Nello Carrara", Sesto Fiorentino, Italy.

E-mail address: f.grazzi@ifac.cnr.it (F. Grazzi).

¹ Present address.