PAUL SCHERRER INSTITUT

Prof. Dr. Marco Stampanoni
Head of the X-ray Tomography Group
Swiss Light Source WBBA/216
CH-5232 Villigen PSI
Switzerland

Phone +41-56 310 47 24
E-mail marco.stampanoni@psi.ch

Villigen, September 11th, 2013

Dear Editors,

Please find enclosed our manuscript entitled “X-ray phase-contrast imaging at 100 keV” that we wish to be considered for publication as research article in Nature Physics.

In this work we present the worldwide first X-ray phase-contrast image obtained at 100 keV using a conventional X-ray source. We describe the fundamental idea, the experimental setup we implemented to realize it (including a detailed description of the new optics design) and discuss system performance and potentiality.

Our approach is based on Talbot interferometry exploiting a novel grating design and arrangement. We introduce an “edge-on” illumination of circularly aligned grating structures. “Edge-on” illumination, as opposed to “face-on” illumination -- which has been so far the standard approach -- enables the fabrication of gratings with high aspect ratios required for efficient high-energy imaging. Our solution further allow for circularly aligned grating structures, which are necessary to enable a large field of view on compact setups. Our results finally demonstrate that phase contrast X-ray imaging can be performed at high X-ray energies, which are relevant for many applications, ranging for medical diagnostics to non-destructive testing or homeland security and paves to road to its implementation in these areas.

We believe that this breakthrough experiment deserves attention from a broad community and therefore we are submitting it to Nature Physics, which is known to be the leading journal in the field.

We confirm that this manuscript has not been published elsewhere and is not under consideration by another journal. All authors have approved the manuscript and agree with submission to *Nature Physics*. The authors declare no potential competing relevant financial interests to this article.

We would like to recommend the following researchers as potential reviewers for this paper:

1. Prof. Dr. Janos Kirz, Advanced Light Source, Lawrence Berkeley National Laboratory, 1 Cyclotron Road, MS 80R0114, Berkeley, CA 94720 USA
   Email: jkirz@lbl.gov, Phone: +1-510-486-5423, Fax: +1-510-486-4960

2. Prof. Dr. Giorgio Margaritondo, Ecole Polytechnique Federale de Lausanne, Laboratoire de Physique des Rayons X, Rte de la Sorge, CH-1015 Lausanne, Switzerland
   E-mail: giorgio.margaritondo@epfl.ch, Phone : +41-21-6934471, Fax : +41-21-6930443

3. Dr. Peiping Zhu, Beijing Synchrotron Radiation Facility, Beijing, China
   E-mail: zhupp@ihep.ac.cn, Phone: +86-10-88235990

4. Prof. Dr. David Attwood, Electrical Engineering and Computer Science College of Engineering, University of California, Berkeley, CA 94720 USA
   E-mail: attwood@berkeley.edu, Phone: +1-510-486-4463, Fax: +1-510-643-6103

We kindly ask the following researchers to be excluded as reviewers because of strong conflicts of interest:

1. Prof. Dr. Franz Pfeiffer, Fakultät für Physik, Technische Universität München, James-Frank-Str. 1, D-85748 München, Germany, E-Mail: franz.pfeiffer@tum.de

2. Prof. Dr. Rüdiger Schulz-Wendtland, Radiologisches Institut, Universitäts-klinikum Erlangen, Maximiliansplatz 1, D-91054 Erlangen, Germany, E-Mail: ruediger.schulz-wendtland@uk-erlangen.de

3. Prof. Dr. Atsushi Momose, Department of Advanced Materials Science, University of Tokyo, Japan, E-Mail: momose@exp.t.u-tokyo.ac.jp

4. Prof. Dr. Alessandro Olivo, Department of Medical Physics and Bioengineering, University College London, England, E-Mail: a.olivo@medphys.ucl.ac.uk

We look forward to hearing from you at your earliest convenience and, for any additional information or clarification you might need, please do not hesitate to contact me.

Yours faithfully,

Prof. Marco Stampanoni
Associate Professor for X-ray Imaging at the Swiss Federal Institute of Technology, Zürich, Switzerland
Head of the X-ray Tomography Group of the SLS at the Paul Scherrer Institut, Villigen, Switzerland