Contribution ID: **230** Type: **Poster presentation + pitch**

BLEMAB European project: muon imaging technique applied to blast furnaces

The BLEMAB project (BLast furnace stack density Estimation through on-line Muon ABsorption measurements) [1], evolution of the previous Mu-Blast project [2], will investigate in detail the capability of muon radiography techniques, applied to the imaging a blast furnace inner zone. In particular, the geometry and size of the so called "cohesive zone", i.e. the spatial zone where the slowly downward moving material begins to soften and melt, that plays such an important role in the performance of the blast furnace itself. Thanks to the high penetration power of natural cosmic ray muon radiation, muon transmission radiography could be an appropriate non invasive methodology for the imaging of large high-density structures such as a blast furnace, whose linear dimensions can be up to a few tens of meters. A state of the art muon tracking system, derived from our previous experience with the MIMA and MURAVES detector (references [3,4]), is currently in development, and will be installed at a blast furnace on the ArcelorMittal site in Bremen (Germany), where it will take data for many months. The sketch on the left side in figure 1, not to scale, shows one of the two BLEMAB muon trackers placed a few meters far from the blast furnace wall, pointed along the direction where the cohesive zone is expected to be. The plot on the right side in the same figure shows the two dimensional muon flux angular distribution that is expected within the BLEMAB detector geometrical acceptance after one day data taking. Hundreds of muons are expected each day, for each angular bin with a size of 2 deg in azimuth and 2 deg in elevation, thus allowing a continuos measurement of the average density distribution keeping statistical fluctuations at less than ten percent. Muon radiography results will also be compared with measurements obtained through an enhanced multipoint probe and standard blast furnace models.
We will present the project, its development status and the expectations based on preliminary simulations.

[1] BLEMAB - EU project, RFCS 2019, G.A. n. 899263
[2] Mu-Blast –EU project, RFCS 2014, RFSR-CT-2014-00027
[3] G. Baccani et al., 2018 JINST 13 P11001
[4] G. Saracino et al., Ann.Geophys.Italy 60 (2017) 1, S0103

Author: BONECHI, Lorenzo (Universita e INFN, Firenze (IT))

Co-authors: AMBROSINO, Fabio (Universita e sezione INFN di Napoli (IT)); ANDREETTO, Paolo (Universita e INFN, Padova (IT)); BONOMI, Germano (Universita di Brescia (IT)); Dr BORSELLI, Diletta (Department of Physics and Geology, University of Perugia and INFN Florence (IT)); BUHLES, Thorsten (Hochofenwerk / ArcelorMittal Bremen GmbH, Bremen, Deutschland); BOTTAI, Sergio (Universita e INFN, Firenze (IT)); Prof. CALLIARI, Irene (Department of Industrial Engineering, University of Padua, Padua (IT)); Dr CHIAROTTI, Ugo (Rina Consulting – Centro Sviluppo Materiali SpA, Rome (IT)); CHECCHIA, Paolo (Universita e INFN, Padova (IT)); CIMMINO, Luigi (University of Naples "Federico II"); CIARANFI, Roberto (Universita e INFN, Firenze (IT)); Dr CIALDAI, Carlo (INFN Florence (IT)); CIULLI, Vitaliano (Universita e INFN, Firenze (IT)); D'ALESSANDRO, Lel (Universita e INFN, Firenze (IT)); D'ERRICO, Mariaelena (Universita e INFN, Napoli (IT)); Dr FERRETTI, Raffaele (Rina Consulting –Centro Sviluppo Materiali SpA,Terni (IT)); Dr FINKE, Fabian (Ironmaking Department/ArcelorMittal Bremen, GmbH, Bremen (DE)); Dr FRANZEN, Andreas (Ironmaking Department/ArcelorMittal Bremen GmbH, Bremen (DE)); Dr BJÖRN, Glaser (KTH Royal Institute of Technology, Stockholm (SE)); Dr GONZI, Sandro (Università degli Studi di Firenze and INFN (IT)); Dr LIU, Yu (KTH Royal Institute of Technology, Stockholm (SE)); LORENZON, Altea (Universita e INFN, Padova (IT)); MASONE, Vincenzo (INFN Naples (IT)); Dr PEZZATO, Luca (University of Padua, Padua (IT)); Dr NECHYPORUK, Oleksandr (Ironmaking department, ArcelorMittal Maizières Research,

Maizières-lès-Metz (FR)); Dr RANGAVITTAL, Bharath Vasudev (KTH Royal Institute of Technology, Stockholm (SE)); Dr RESSEGOTTI, Davide (KTH Royal Institute of Technology, Stockholm (SE)); SARACINO, Giiulio (Universita e sezione INFN di Napoli (IT)); VILIANI, Lorenzo (Universita e INFN, Firenze (IT)); STARODUBTSEV, Oleksandr (Universita e INFN, Firenze (IT)); Dr SAUERWALD, Jan (Ironmaking Department / ArcelorMittal, Bremen GmbH, Bremen (DE))

Presenter: BONECHI, Lorenzo (Universita e INFN, Firenze (IT))

Session Classification: Poster session 1

Track Classification: Applications