The MU-RAY telescope

G. Ambrosi[a], F. Ambrosino[b,c], A. Anastasio[b], D. Basta[b], R. Battiston[a,d], A. Bross[e], S. Callier[f], F. Cassese[b], G. Castellini[g], R. Ciaranfi[h], L. Cimmino[c], R. D'Alessandro[h,i], B. De Fazio[c], C. de La Taille[f], F. Garufi[c], G. Iacobucci[b], A. Lauria[c], V. Masone[b], M. Martini[j], S. Miyamoto[k], M.C. Montesi[c], R. Nishiyama[k], P. Noli[b,c], M. Orazi[j], L. Parascandolo[b], G. Passeggio[b], R. Peluso[j], A.Pla-Dalmau[e], L. Raux[f], R. Rocco[b], P. Rubinov[e], G. Saracino[b,c], G. Scarpato[j], G. Sekhniaidze[b], P. Strolin[b,c], A. Taketa[k], H.K.M, Tanaka[k], M. Tanaka[l], T. Uchida[l], I. Yokoyama[m]

a: INFN Sezione di Perugia, Italia; b: INFN Sezione di Napoli, Italia; c: Dipartimento di Scienze Fisiche, Università Federico II, Napoli, Italia; d: Università di Perugia, Italia; e: Fermilab, USA; f: LAL, Orsay, France; g: CNR-IFAC, Firenze,Italia; h: INFN Sezione Firenze, Italia; i:Università di Firenze, Italia; j: INGV -Osservatorio Vesuviano, Napoli, Italia; k: Earthquake Research Institute, The University of Tokyo, Japan; l: High Energy Accelerator Research Organization, Japan; m: Usu Volcano Laboratory, Hokkaido University Japan.

Corresponding author: G. Saracino, e-mail: saracino@na.infn.it

Abstract

The MU-RAY project aims at the construction of muon telescopes and the development of new analysis tools for muon radiography. The telescopes are required to be able to work in harsh environment and to have low power consumption, good angular and time resolutions, large active area and modularity. High background suppression is required. A prototype telescope has been constructed. The detector is composed of three stations consisting of two planes of one square meter area, for the measurement of the X-Y coordinate. The three stations are assembled on a frame where their relative distance can be modified. The frame can be easily rotated to change the azimuth angle. Each plane consists of two modules made by 32 scintillator strips of triangular cross section coupled with WLS fibres. The light emitted from fibres is read by Silicon Photomultipliers mounted on a custom printed circuit board. A dedicated front-end electronic, based on SPIROC ASIC, and data acquisition system have been developed. The prototype will be installed in this autumn at the Mt. Vesuvius. The detector design, construction and first performances results will be shown.