
ITALIAN INTERCALIBRATION OF ALFA AND BETA RADIOACTIVE SOURCES FOR LUMINESCENCE DATING (CHNET PROJECT)

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Abstract

CHNet is an INFN (Istituto Nazionale di Fisica Nucleare, National Nuclear Physics Institute) network formed by twelve Italian laboratories with acknowledged experience in archaeometry and cultural heritage diagnostics. It aims at supporting, organizing and funding the involved laboratories, and coordinating them to enhance the number and quality of the services available for the public.

For what concerns the luminescence dating techniques, CHNet supports the first Italian interlaboratory calibration of the irradiation by radioactive sources used for TL and OSL dating: ²⁴¹Am and ⁹⁰Sr-⁹⁰Y. The involved laboratory are: Università di Milano-Bicocca, Università di Bari, Università di Torino, Università di Firenze, Laboratori Nazionali di Frascati. In order to improve the accuracy of the accumulated dose assessment in the main TL dating techniques (Zimmermann 1971, Fleming 1970), experiments are carried on both coarse and fine-grained material (180-250 and 4-11 μm respectively).

Each step of the adopted protocols will be described in detail, starting from the material selection through the sample annealing, preparation, packaging and transport, to the final luminescence measurements and data processing.

The beta sources calibration is obtained using the gamma irradiated quartz powders provided by Nordic Laboratory for Luminescence Dating, Aarhus University, Denmark (Hansen et al., 2015). To get calibrated alpha doses, two different irradiation experiments were set up in the tandem accelerator facilities of Naples and Florence. While describing in details the irradiation protocols, three main experimental problems will be underlined: the sample positioning on an axis perpendicular to the beam, the beam spatial irradiation uniformity and the need of a constantly dark working environment.

The available preliminary results will be also shown. References:

Fleming S.J, 1970. Thermoluminescence dating: refinement of the quartz inclusion method. *Archaeometry* 12, 133-147.

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Zimmermann, D.W. (1971) Thermoluminescence dating using fine grains from pottery. *Archaeometry* 13, 29-52.