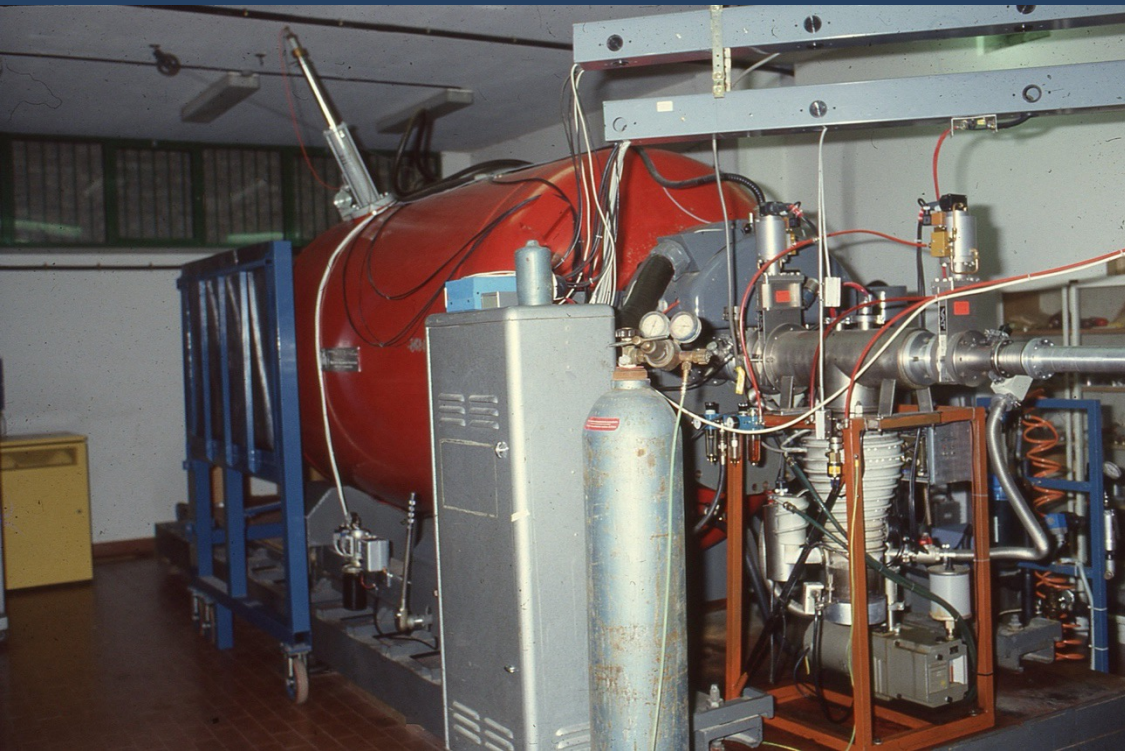
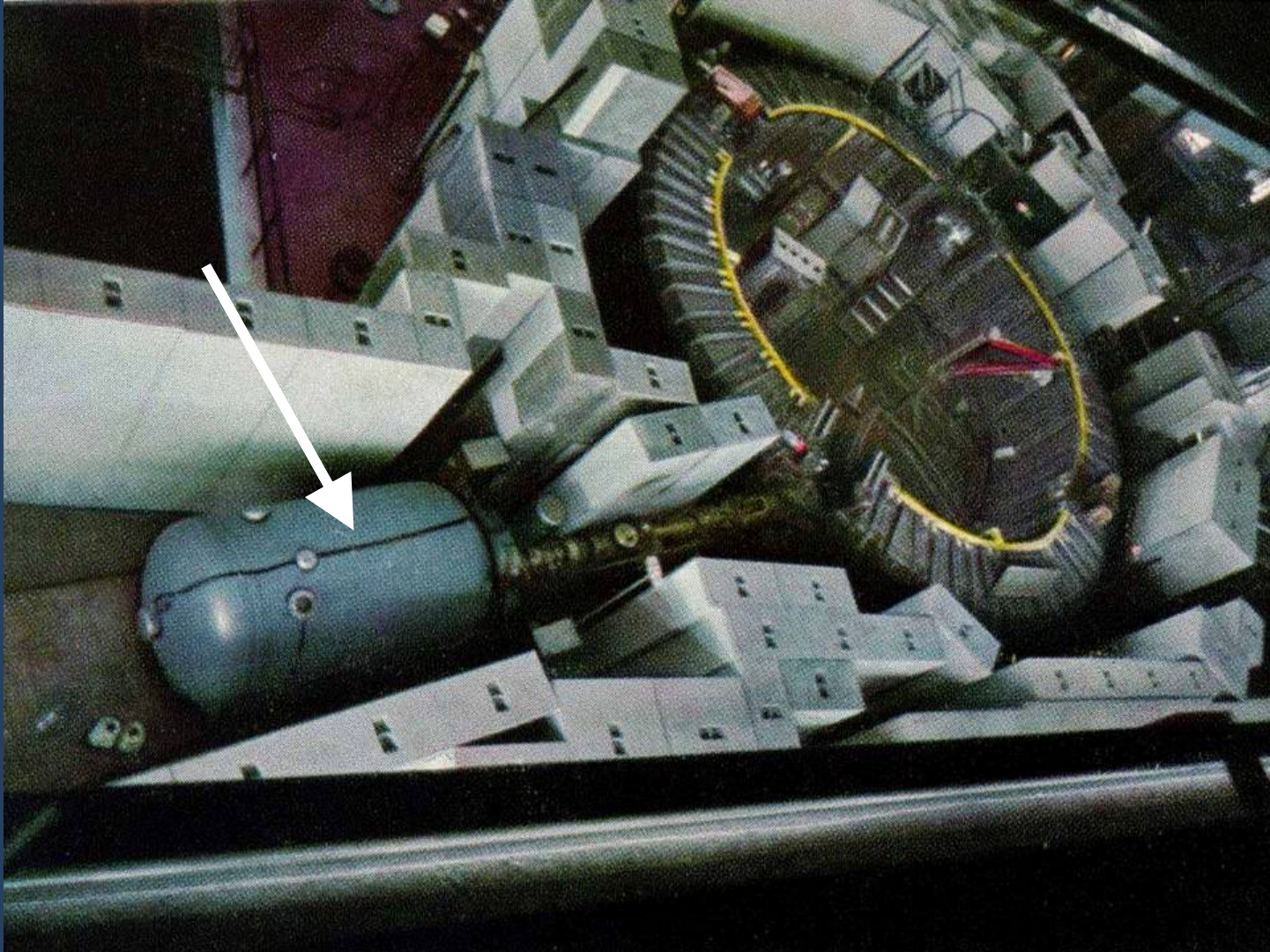


It's true that in a certain sense in Florence we pioneered IBA applications, especially in the field of Cultural Heritage, but mostly thanks to the work of my younger colleagues!



We started almost 40 years ago, using an old 3 MV Van de Graaff «inherited» from fundamental Nuclear Physics experiments

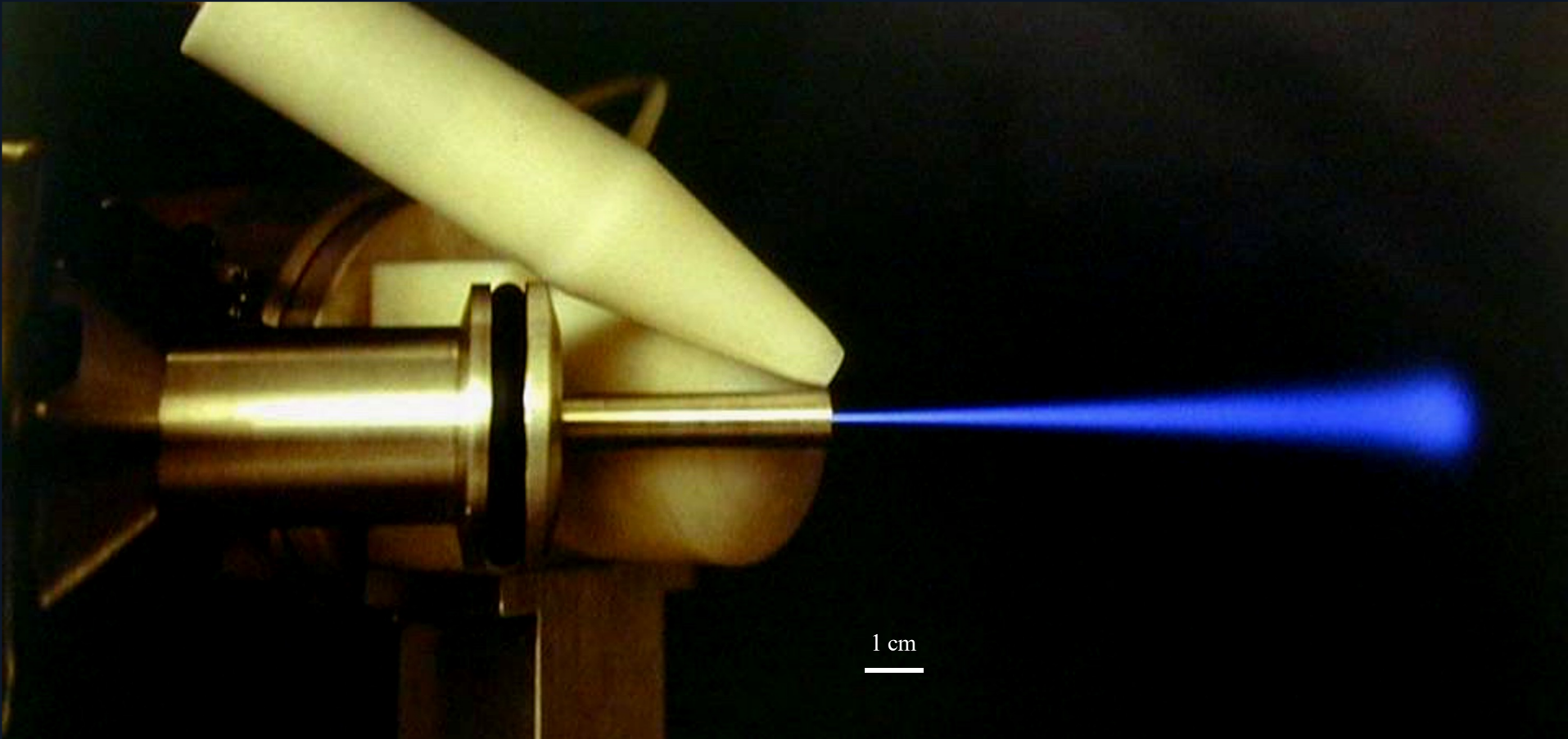


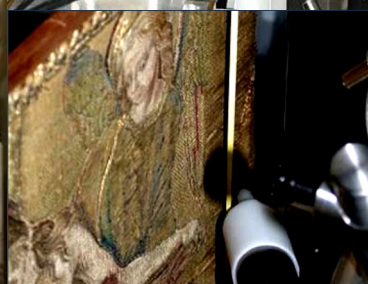
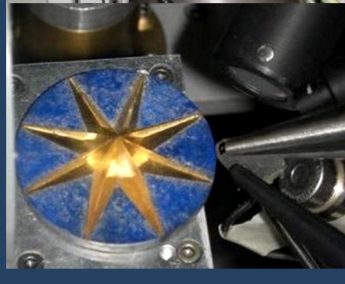
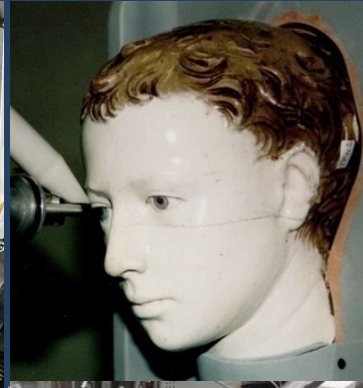
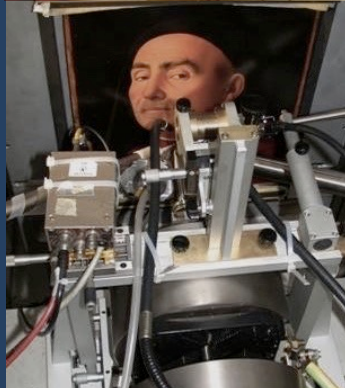
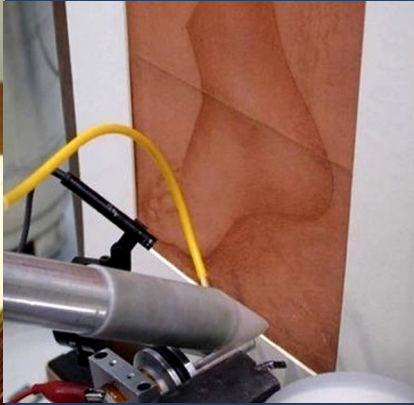
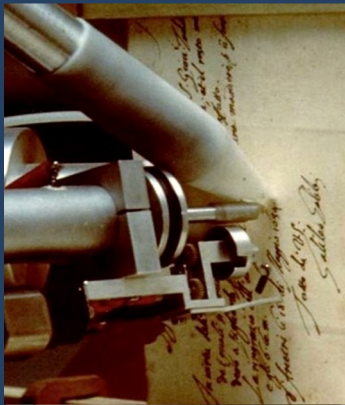
Towards the mid Eighties of last century, after further
10 years or so of experiments for fundamental Physics,
the VdG had given all what it could give to basic
Nuclear Physics

And here started our adventure with nuclear
technologies applied to «unusual» fields....



For applications to CH, an essential requirement was to develop a set-up with an external beam







Istituto Nazionale di Fisica Nucleare
Laboratorio di tecniche nucleari
per l'Ambiente e i Beni Culturali

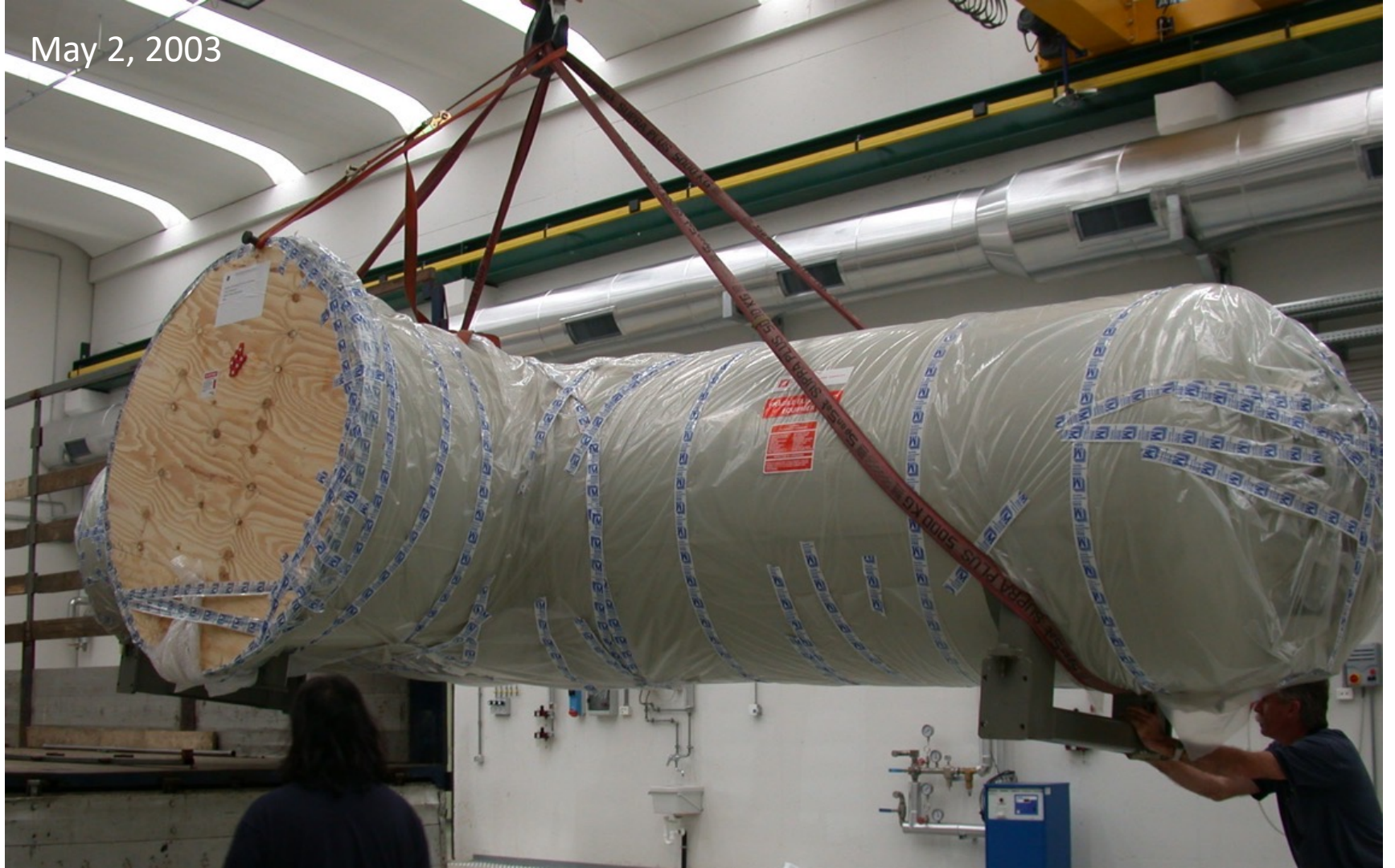
Science and Technology campus
of the Florence University

<https://web.infn.it/labec/>

April 30, 2003



May 2, 2003



We also developed
portable XRF systems



Piero della
Francesca,
Sansepolcro



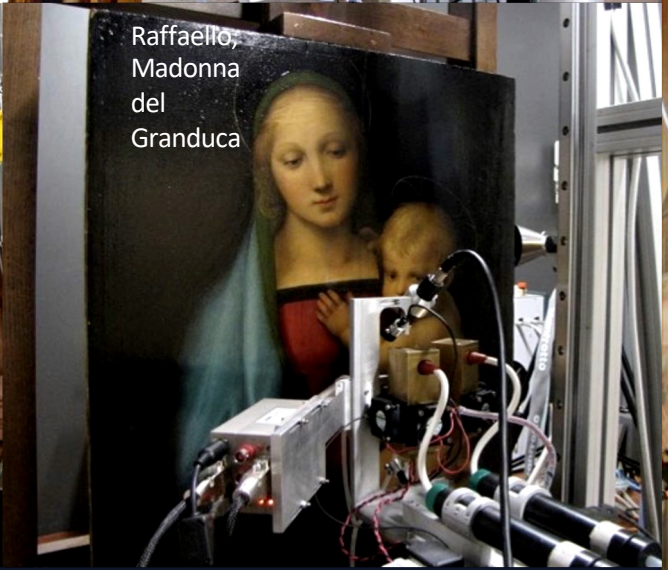
Maestro
di Figline,
S.Croce,
Florence



Chimera di Arezzo, Museo
Acheologico Firenze



Giotto, S. Croce,
Florence



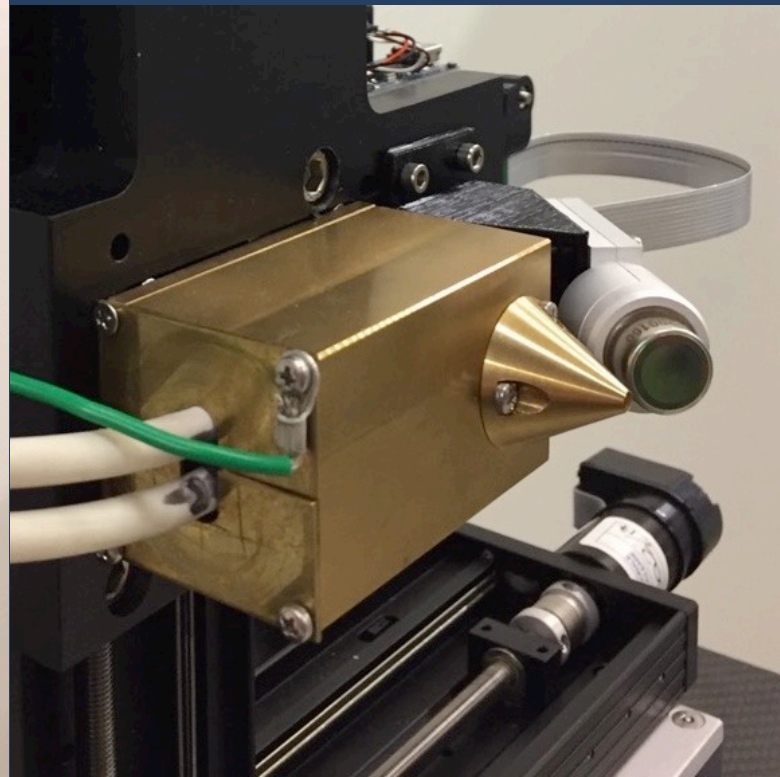
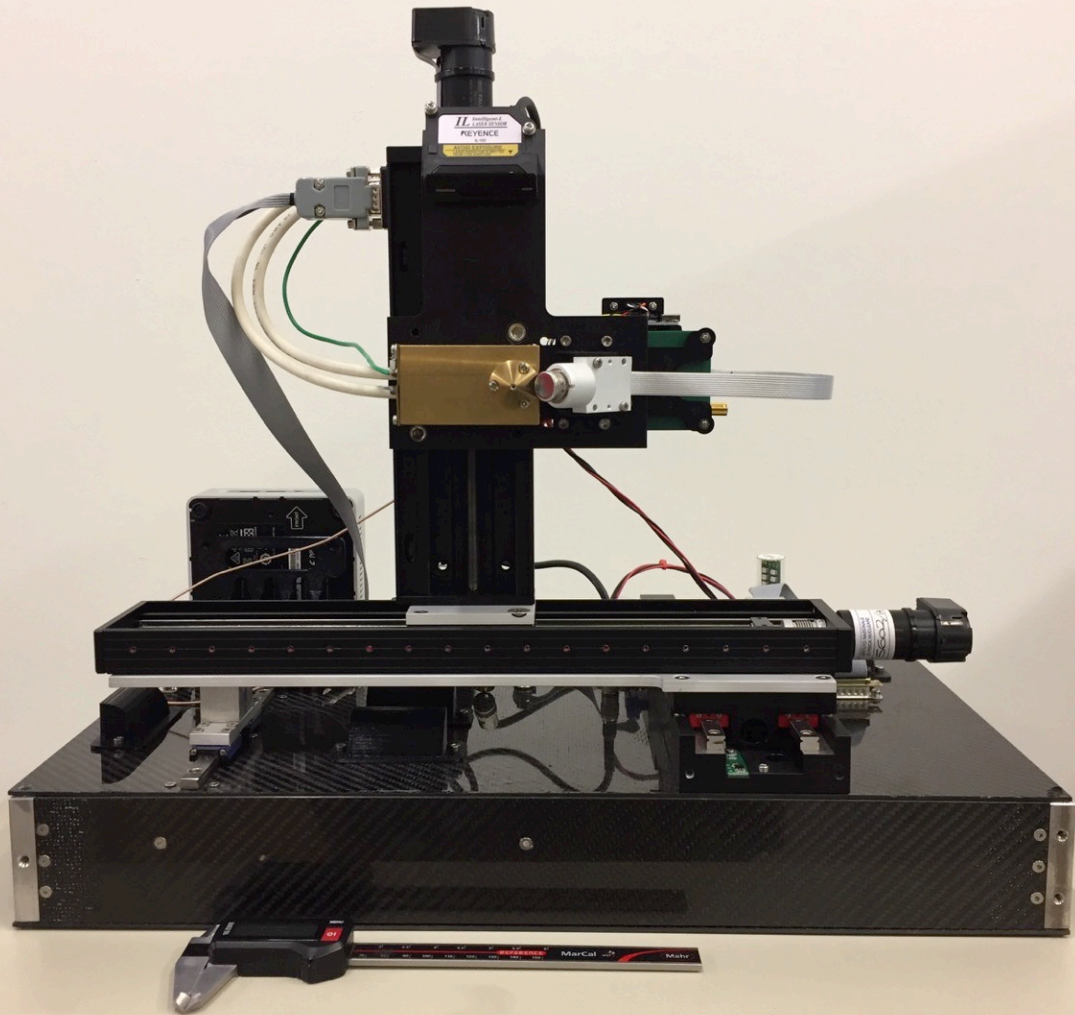
Raffaello,
Madonna
del
Granduca



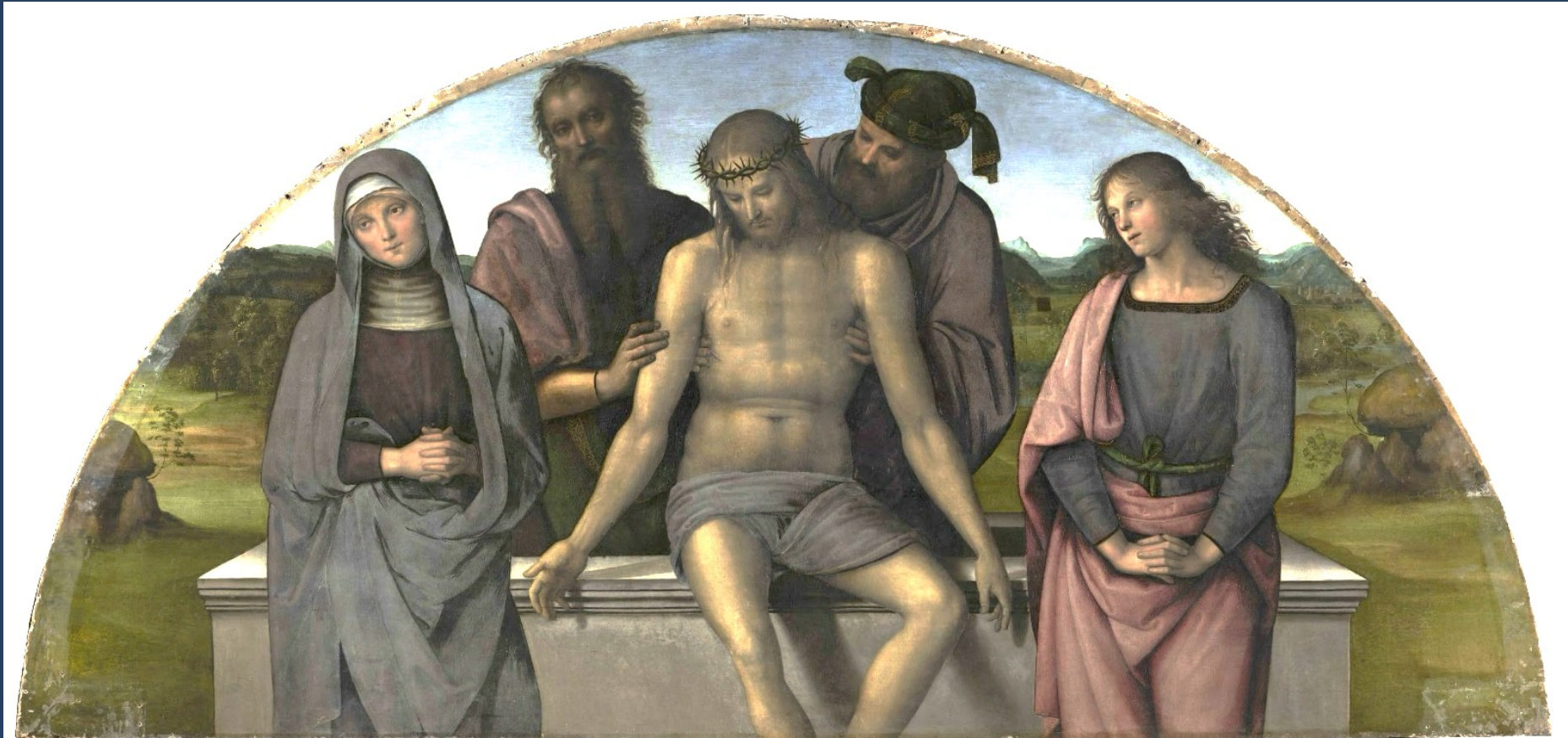
Beato Angelico, S.Marco,
Firenze

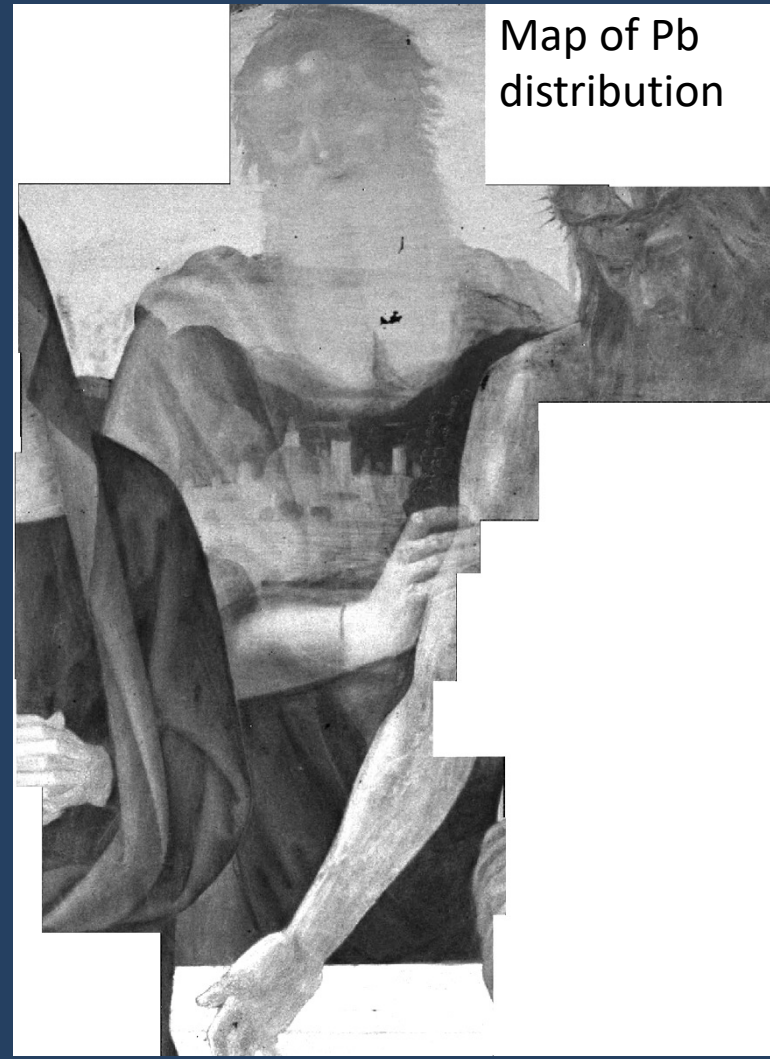
Subsequently evolved to XRF scanning systems

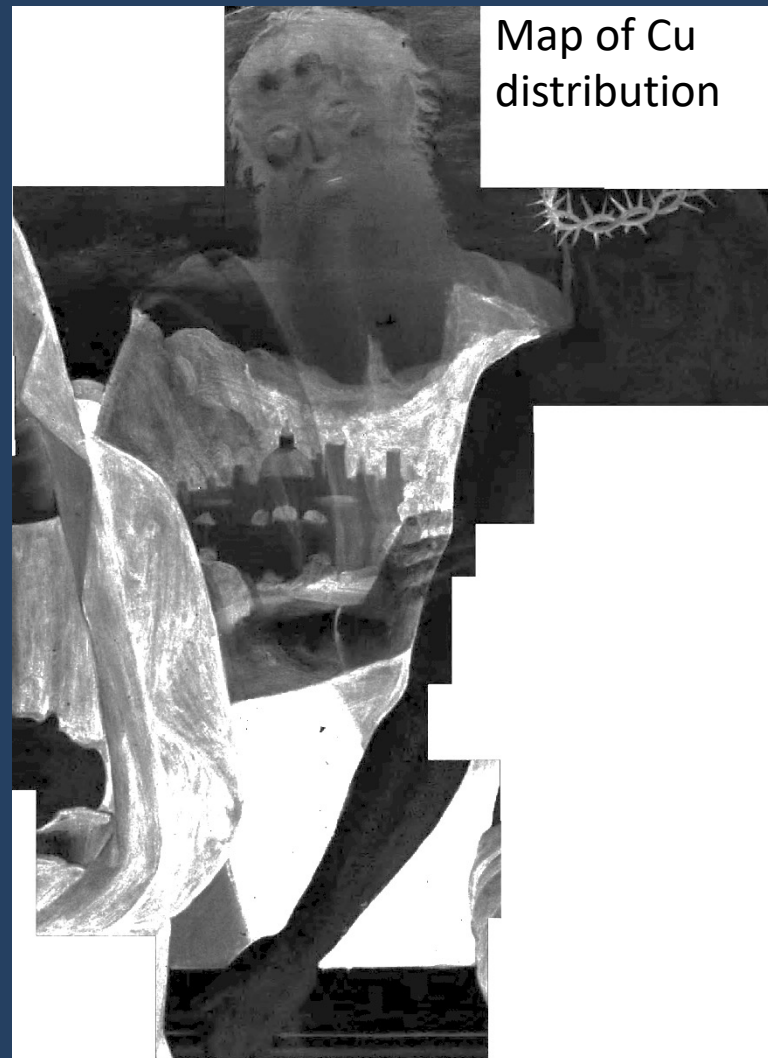
producing elemental distribution maps e.g. in paintings with
portable instrumentation



Perugino, upper part of the Pala di Fano,
oil on wood, 150 x 250 cm²

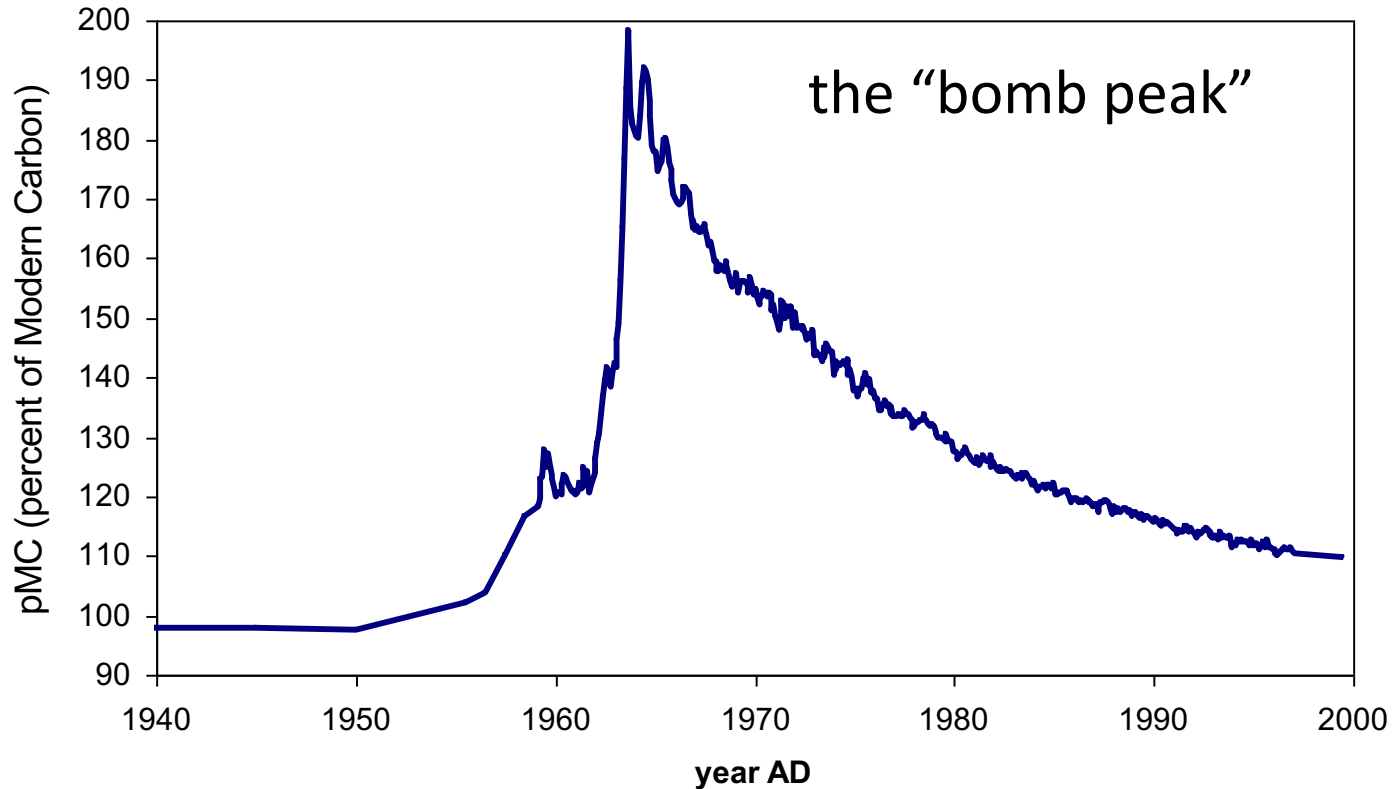






Radiocarbon (^{14}C)

We exploited the effect on ^{14}C concentration in the atmosphere due to nuclear bombs explosion during the cold war





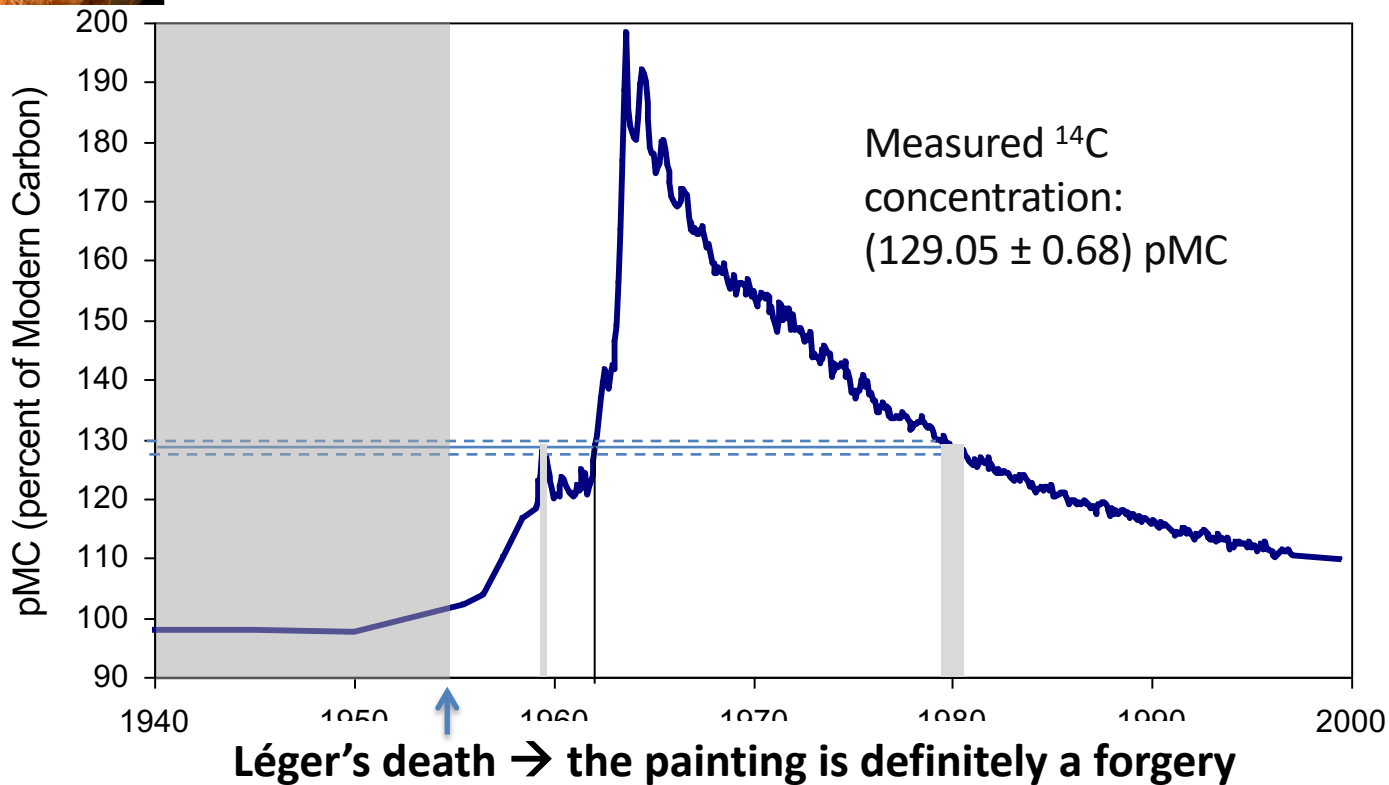
Fernand Léger, Contraste de Formes

Oil on canvas, 92x73 cm

allegedly painted in 1913-14

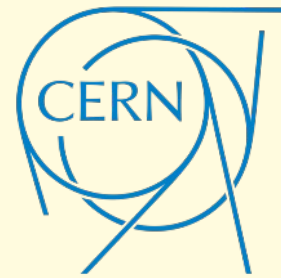
Bought by Peggy Guggenheim for the
Venice Foundation at the end of the '60s

The canvas had been produced with cotton plants cut in
1959, or 1962, or 1979-80





Istituto Nazionale di Fisica Nucleare



The MACHINA project

Movable Accelerator for Cultural Heritage

In-situ Non-destructive Analysis

*INFN - F. Taccetti, L. Castelli, G. Calzolari, M. Chiari,
C. Czelusniak, M. Fedi, P. A. Mandò, M. Manetti, L. Giuntini*

*CERN - S. Mathot, G. Anelli, A. Grudiev, A. Lombardi,
E. Montesinos, M. Vretenar*



The MACHINA project



Joint venture between CERN and INFN, under the auspices of OPD

The core is **a very compact RFQ accelerator for 2 MeV protons**, developed thanks to the experience at CERN in RFQ's technology, with proton source, vacuum systems, controls and electronics developed at LABEC

Realistic compromise between a “perfect tool” for compositional diagnostics and a “movable” instrument, featuring just what is needed to answer the questions put by the restorers, nothing more

