



Elm. Scintillation Crystal Calorimeter for the Endcaps:

- tracker momentum measurement coarse for $\Theta < 10^\circ$,
- a calo detector type needed:
 - very good energy resolution for electrons,
 - better angular resolution, by smaller size?
 - insensitive to rad. background of
 - low energy n's,
 - low energy curling electrons,
 - low energy photons.

} \Rightarrow very rad. hard!

Alternative solution:

PWO crystals, $22 \times 22 \times 243 \text{ cm}^3$ (27 Xo),

50 000 X's for 2 ECs, *needed*

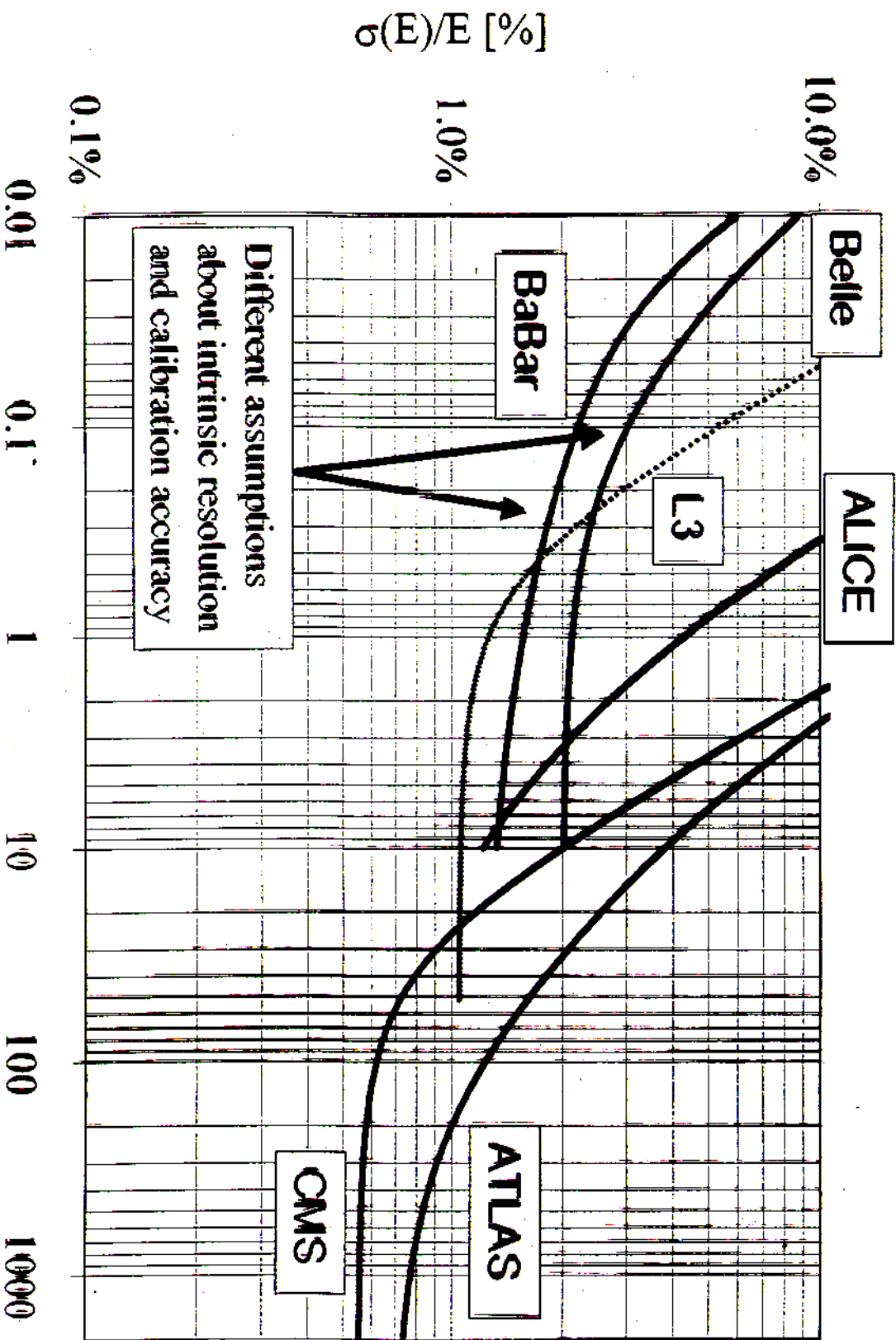
1 X = 118.8 cm^3

1 cm^3 = 2\$ (now) \gg 1\$ (2004, after CMS)

\gg 5.16×10^6 EURO

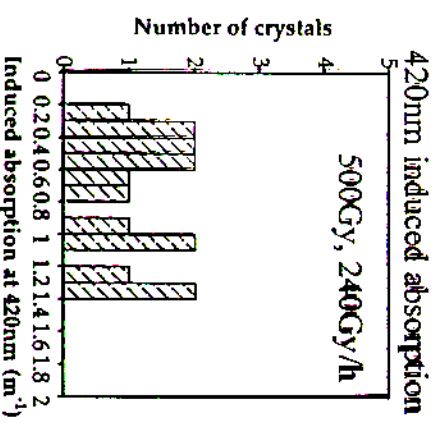
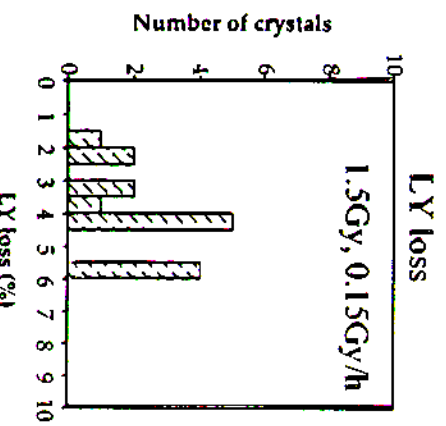
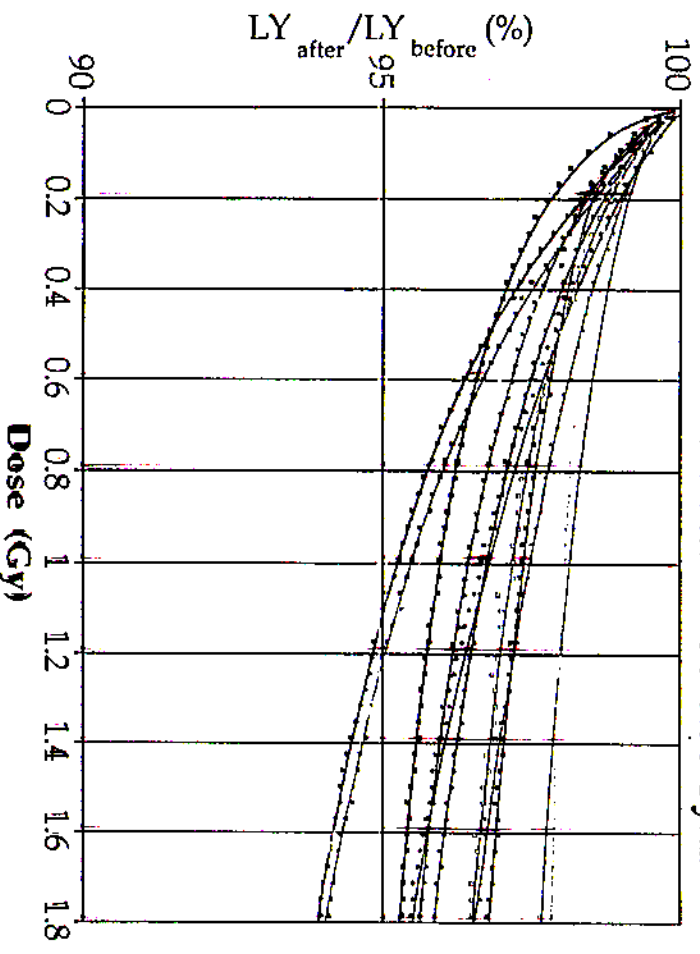
\rightarrow with better performance

(Proposed) Detector Resolution



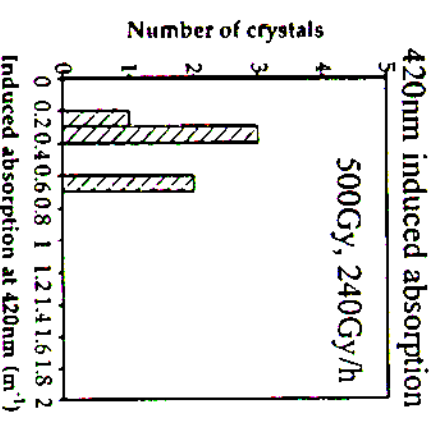
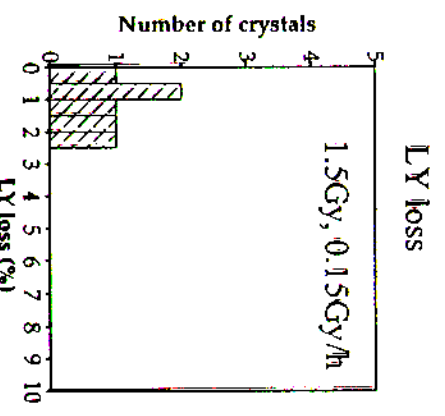
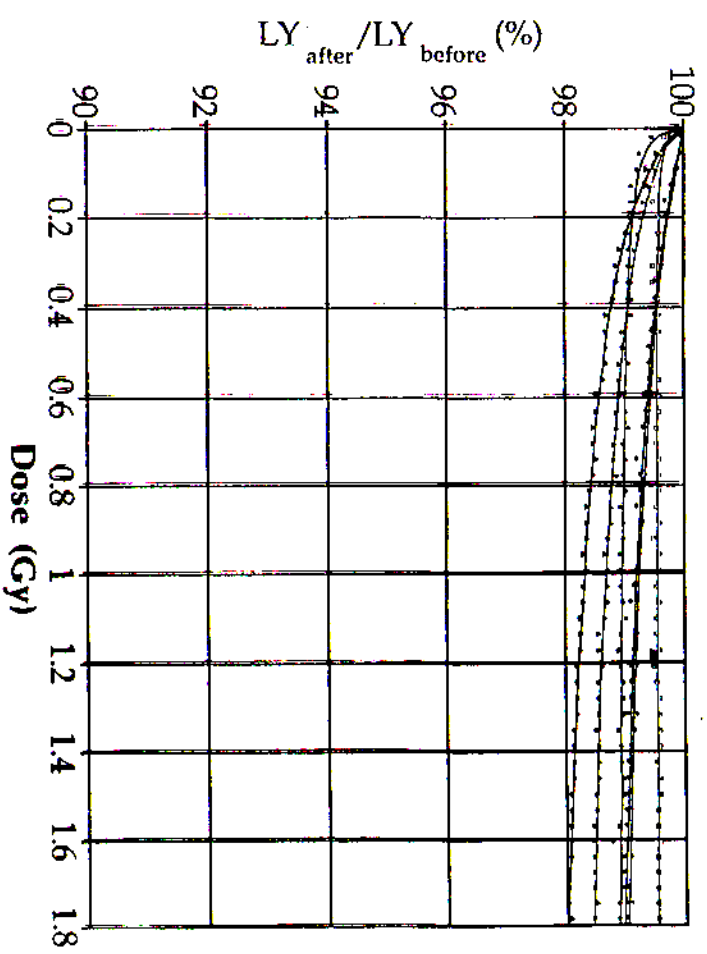
La doped crystals in 98

Front irradiation : ^{60}Co 0.15Gy/h



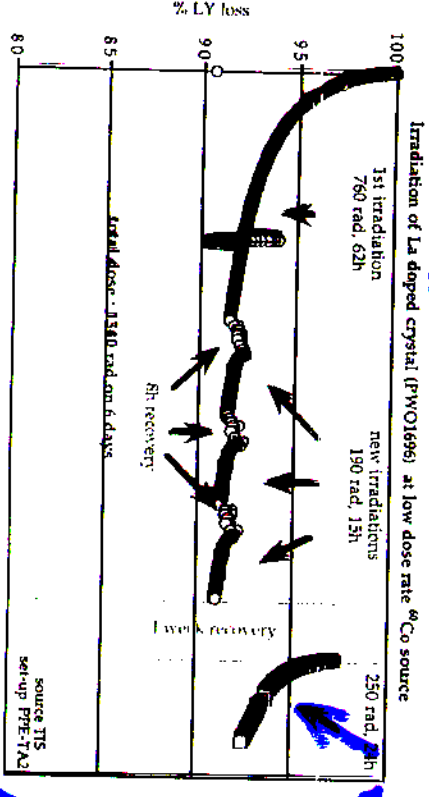
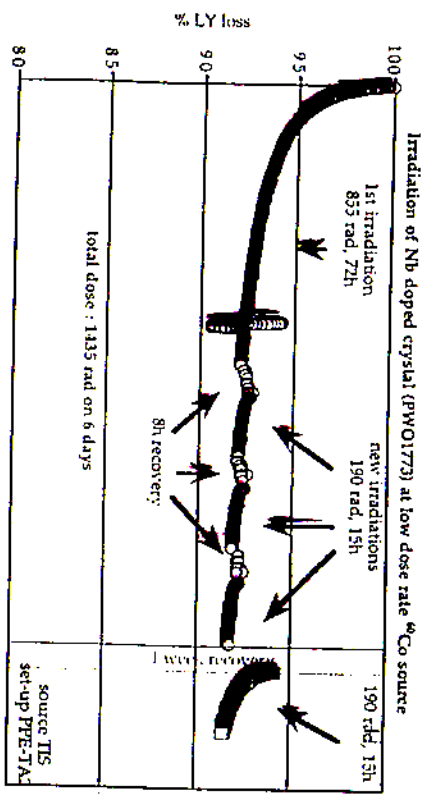
Newly optimized crystals

Front irradiation : ^{60}Co 0.15Gy/h



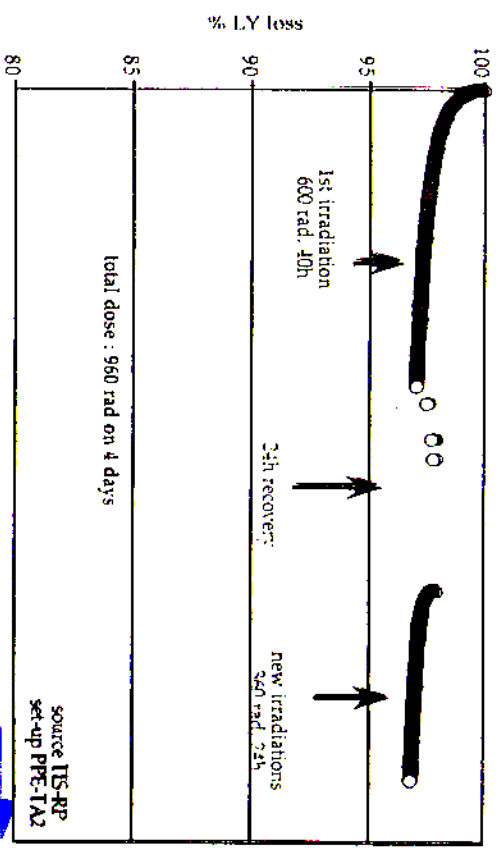
La & Nb doping

LHC type radiation cycle



Newly optimized crystals

LHC type radiation cycle



new doping

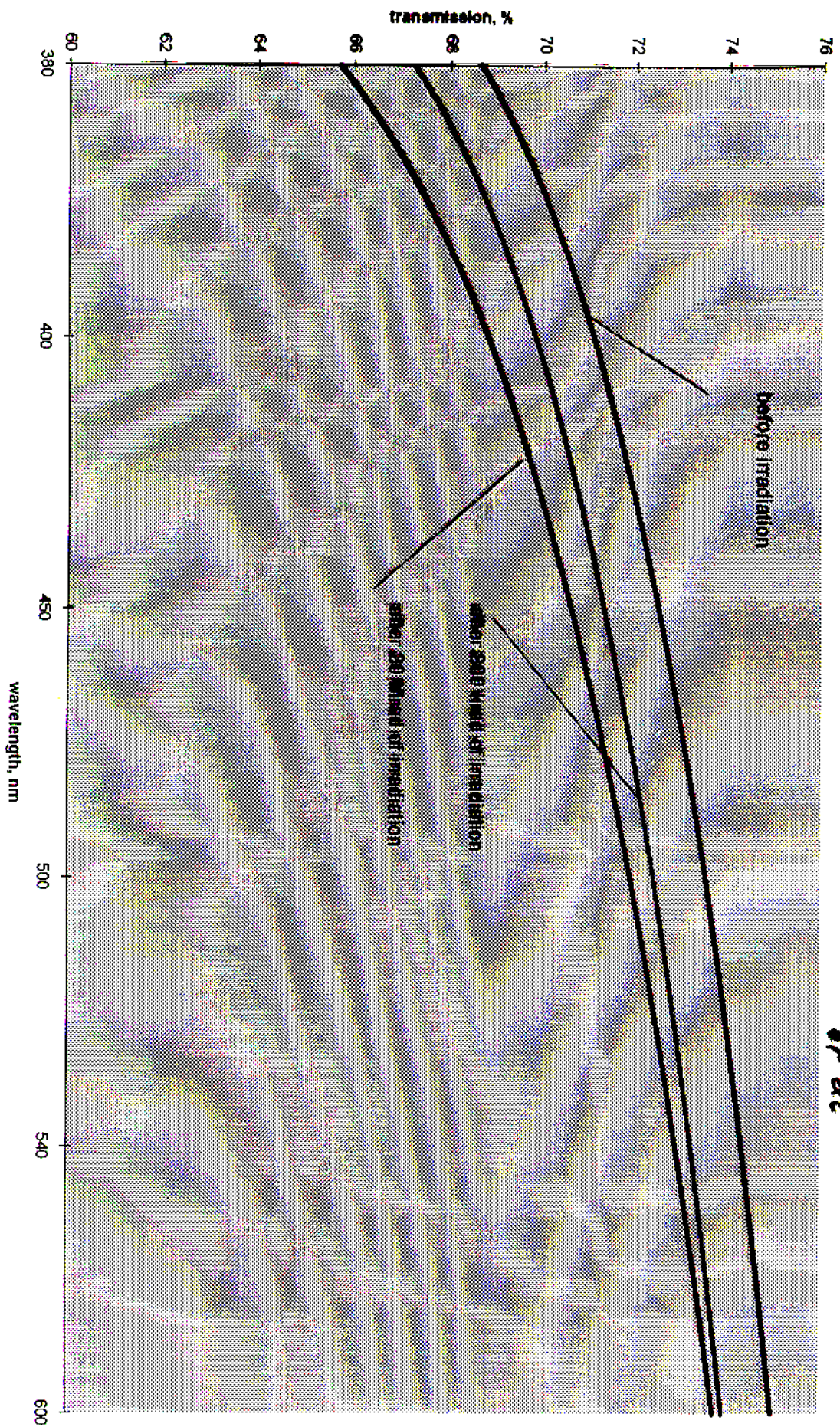
Rome, 7/10/98 conf.

to fast

18.3.99

NOZLOV, L.P.I., Moscow
of ac

PWO(Nb) transmission



"hermetic" calorimeters,

- the problems:

modularity,
support,
service,
readout,
beamhole

