Applications to Medicine of Gamma-rays generated at ALBA

M. Anguiano and A.M.L. (Granada)

J.M. Udías (Madrid)

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Contents

External radiotherapy

- small divergences of the beam

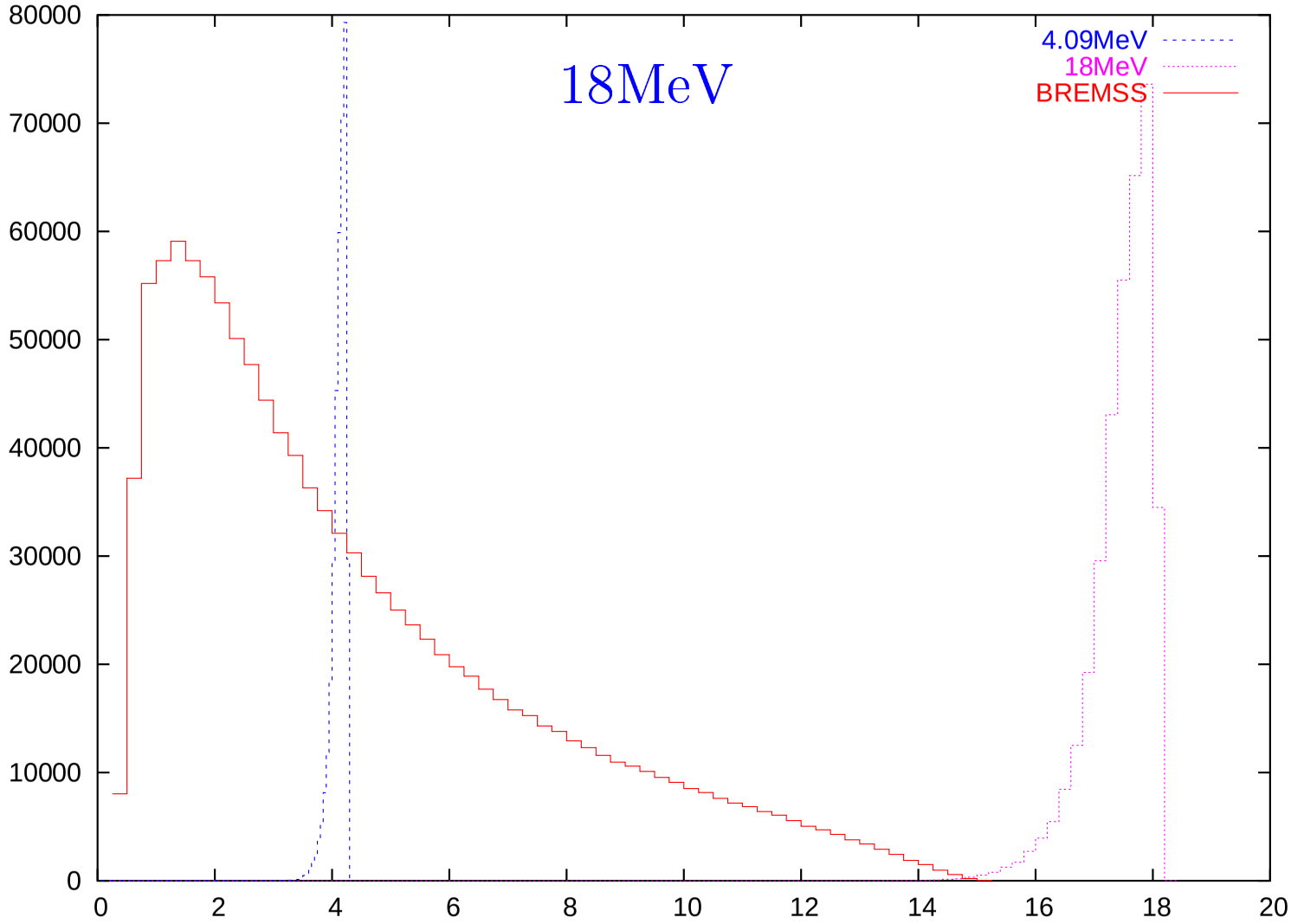
  precision small field treatments

- energy distribution

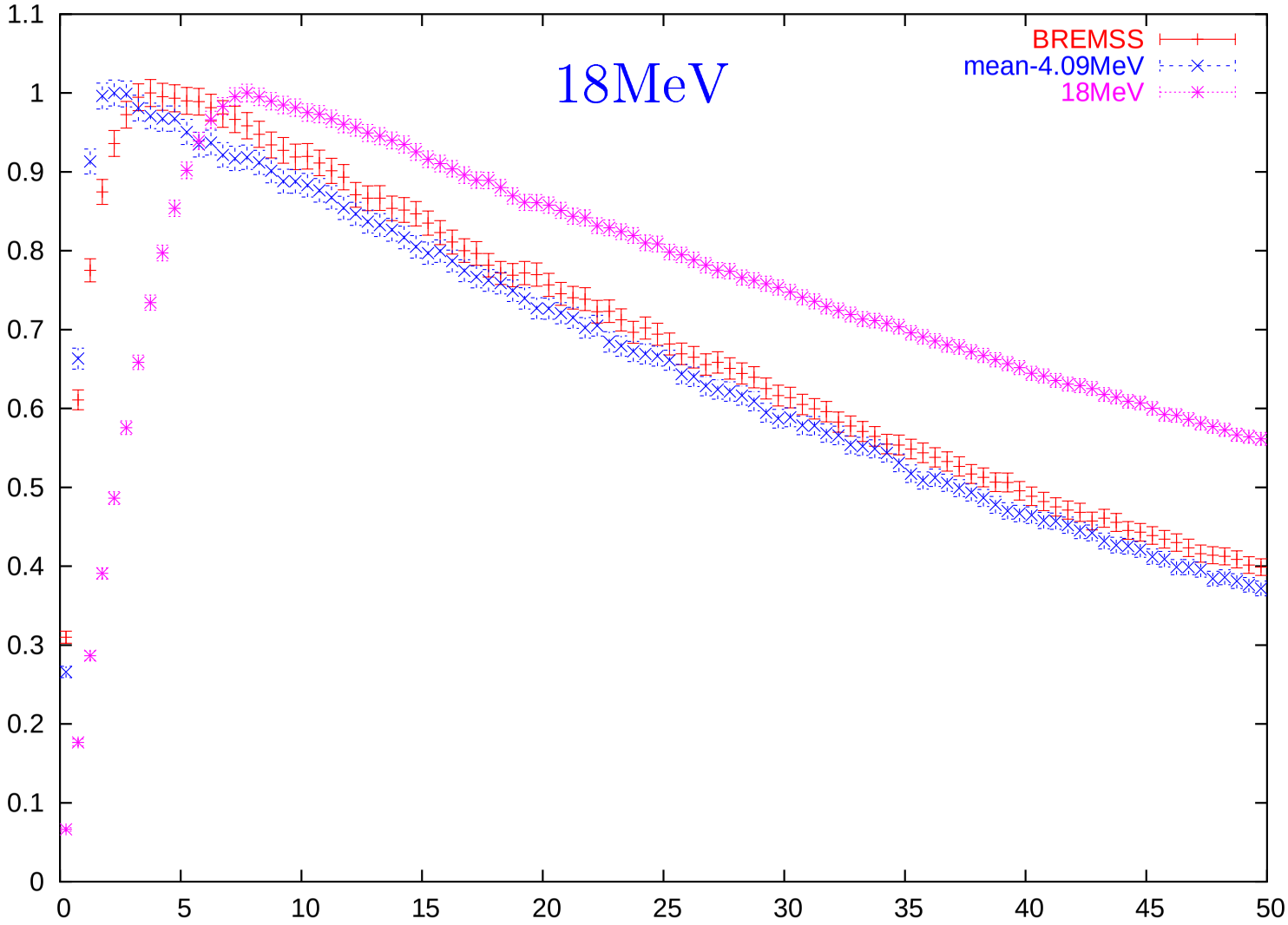
  improvement of the relative tumour to normal tissue dose

  specially for deep tumours !!!

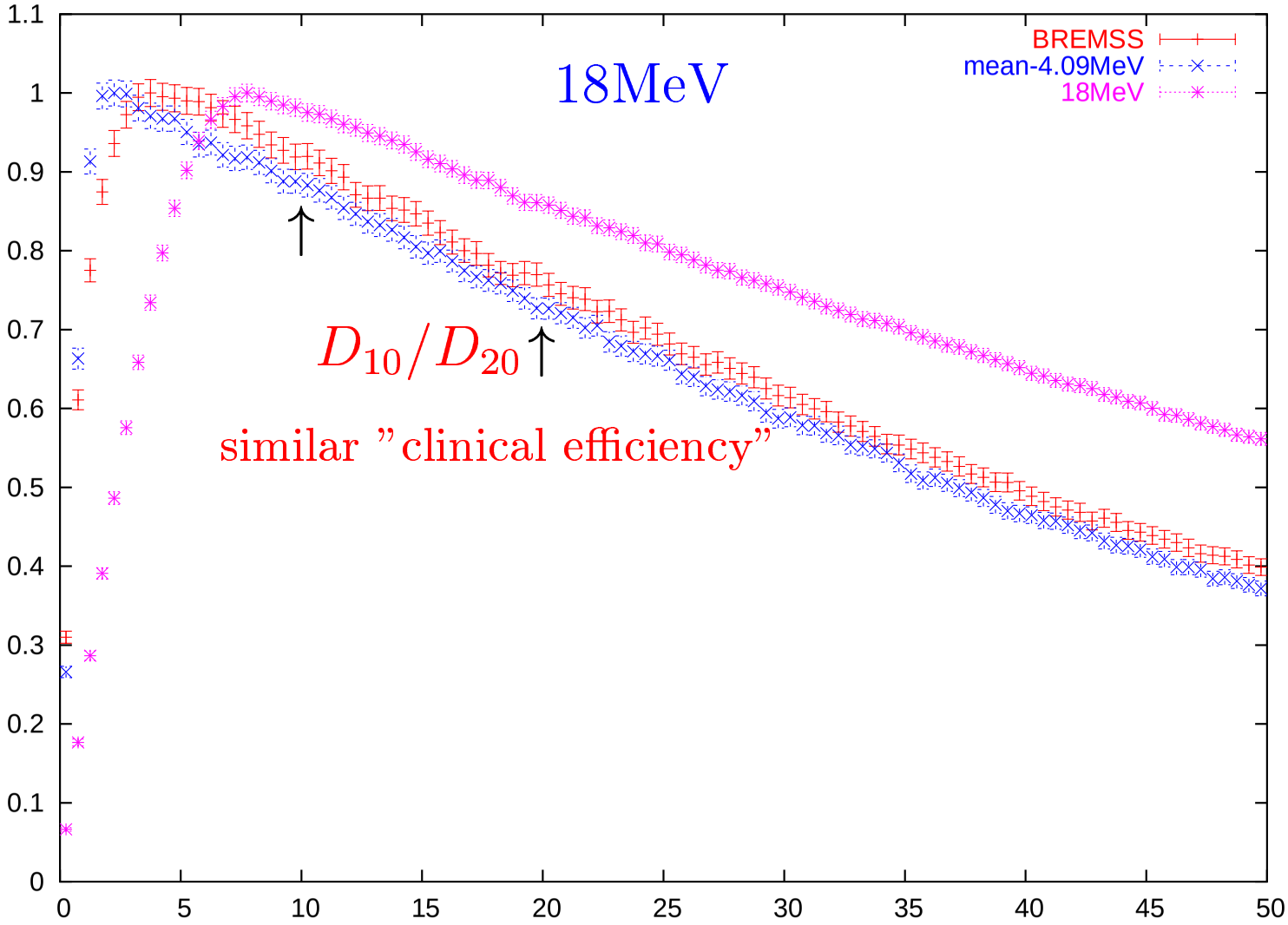
spectra


18MeV
4.09MeV
18MeV
BREMSS
80000
70000
60000
50000
40000
30000
20000
10000
0
0
2
4
6
8
10
12
14
16
18
20

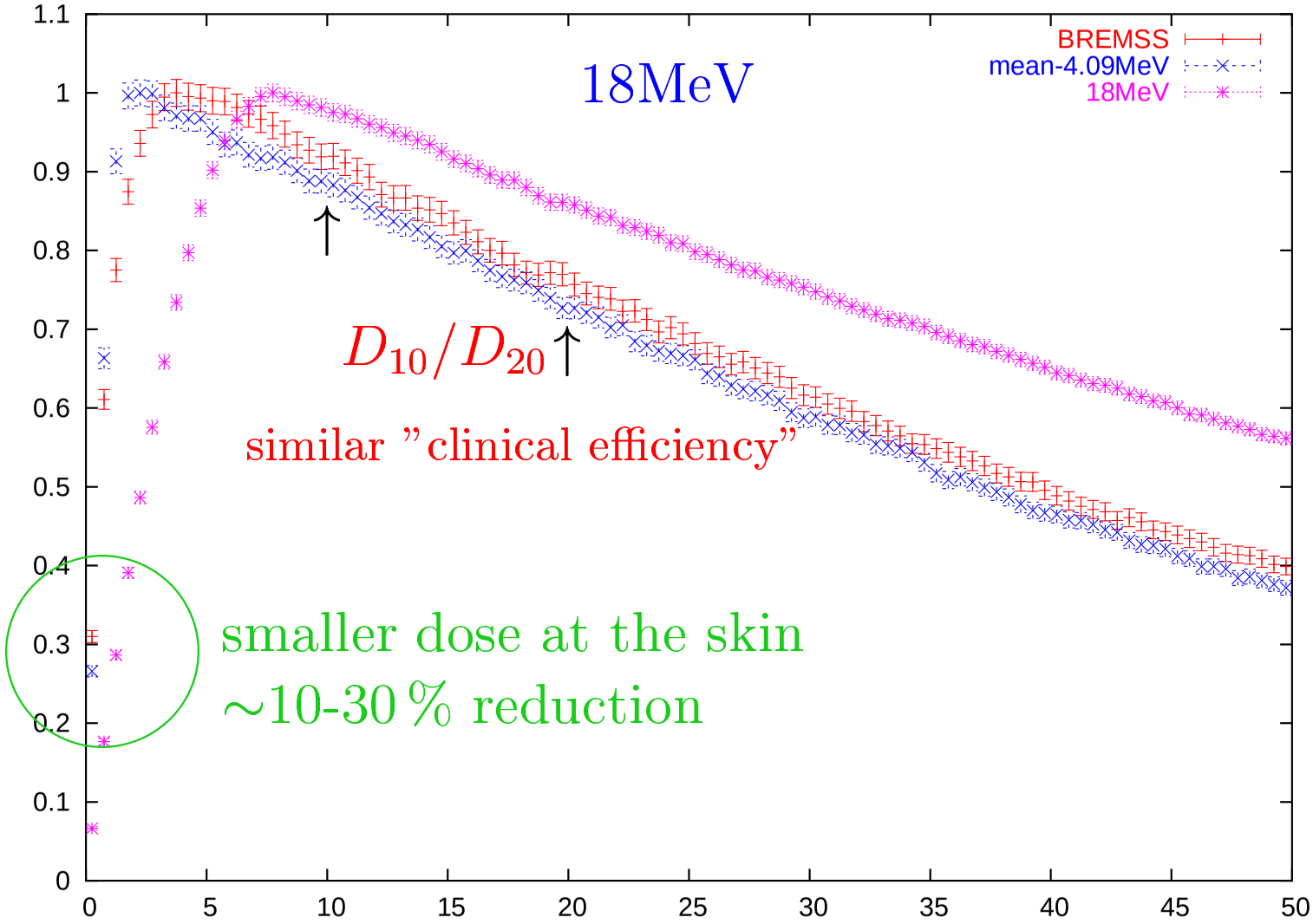
depth dose (in the beam axis)



depth dose (in the beam axis)



depth dose (in the beam axis)



Internal radiotherapy

- in situ activation of short-lived neutron producing radioisotopes (^{165}Ho, ^{197}Au, ^{141}Pr)
  ^{165}Ho(γ,n)^{164}Ho: $\sigma \sim 0.5$ barns at 15 MeV
  + neutron absorption by ^{10}B absorbed by tumour
- photon activation (^{27}Al)
  ulterior β^+ decay could permit monitoring
- photofission

Diagnostic radiology

- quasi-monochromatic x-rays
  - reduction of the imparted dose
  - enhancement of the contrast
- BUT: low energies needed (<100 keV)

Conclusion

the gamma-ray line at ALBA

offer good possibilities for medical applications