THERANOSTIC RADIONUCLIDES @

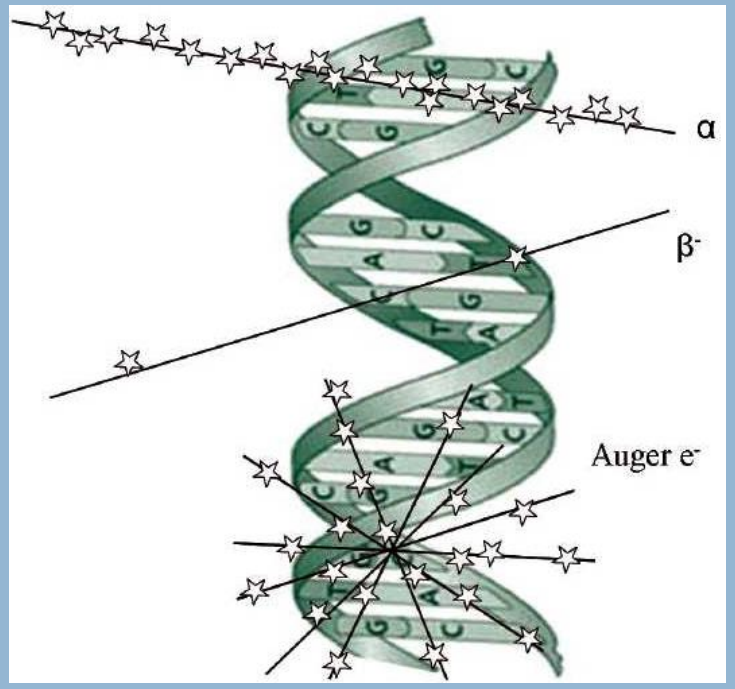
Gaia Pupillo, PhD

gaia.pupillo@lnl.infn.it

INFN

Therapy

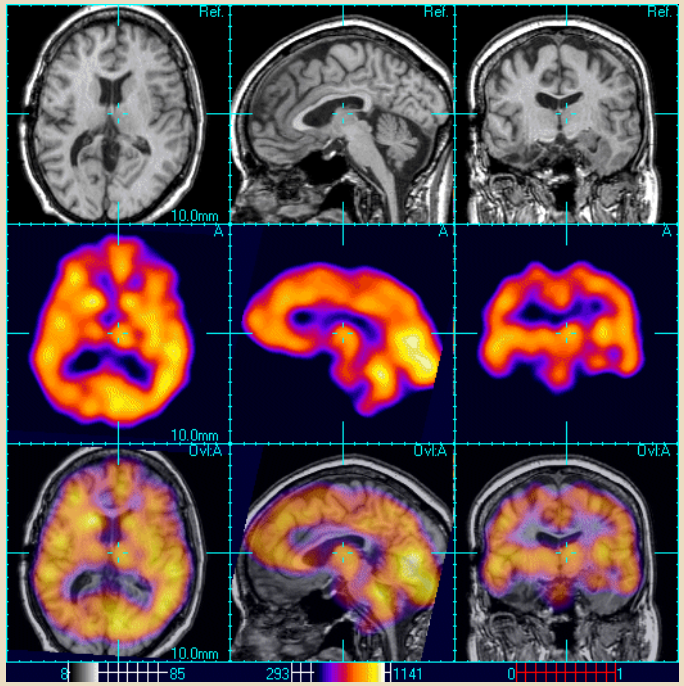
α ; β^- ; Auger e^-



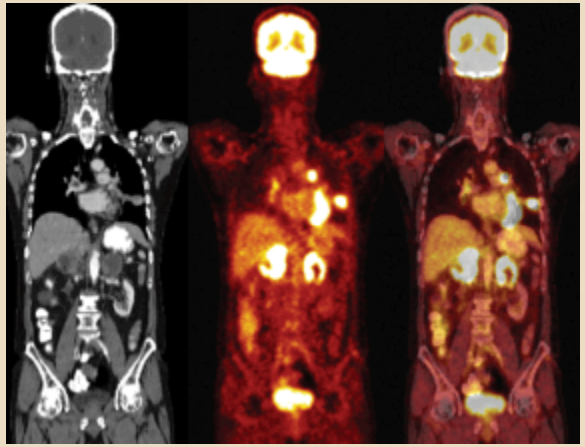
Diagnostic

γ ; β^+

SPECT



PET



Advantage of the use of the **same** radiopharmaceutical labelled with

Theranostic Radionuclides

→ Selection of patients ***prior*** therapy

→ Tailored dosimetry

Theranostic Radionuclides

^{67}Cu

61.83 h half-life

^{47}Sc

80.38 h half-life

β^- and γ radiation

Suitable for SPECT/CT diagnostic
Short-medium range of therapeutic effect

Half-life suitable for slow biodistribution vectors

(e.g. radioimmunotherapy, RAIT)

^{67}Cu

COME

COpper MEasurement

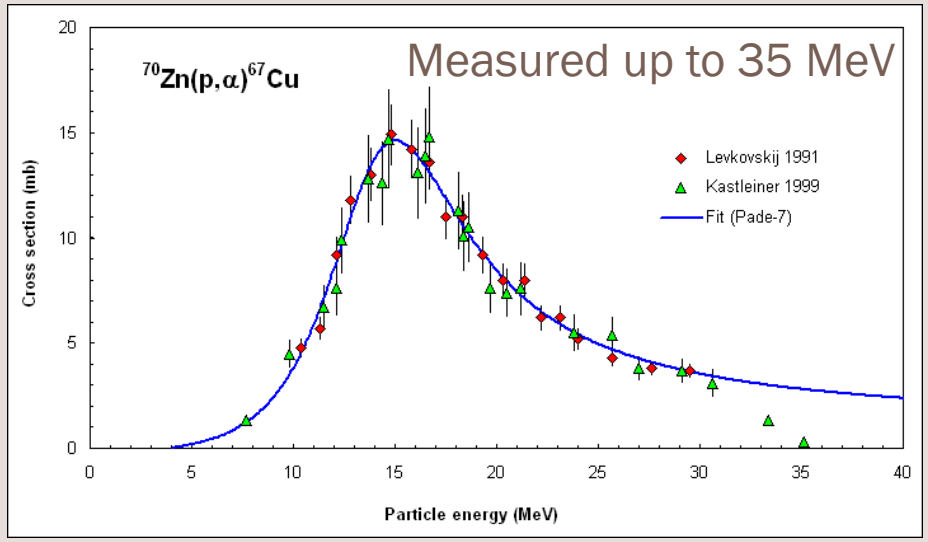
INFN Project 2016 (Dotazioni CSN3 - LNL)

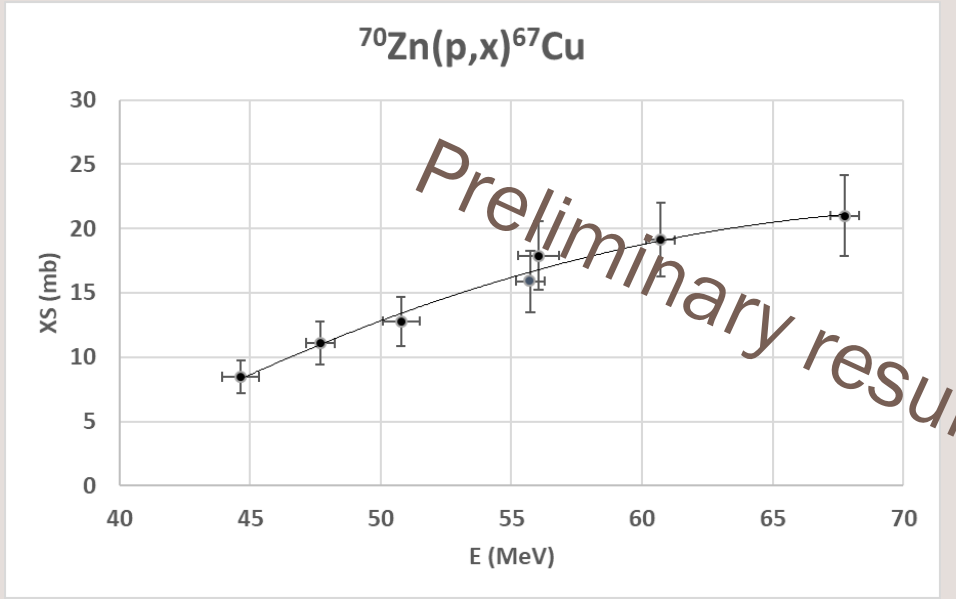
^{67}Cu

Research results

COME

- Cross section measurement with ^{70}Zn targets in collaboraton with Arronax facility (Nantes, France)
- Development of radiochemical process @ FE

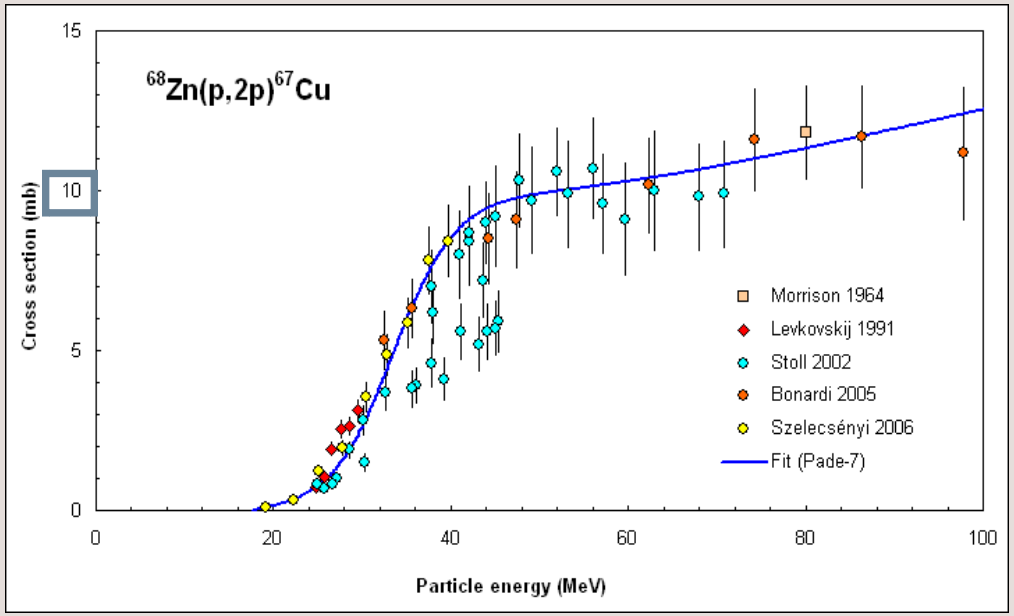


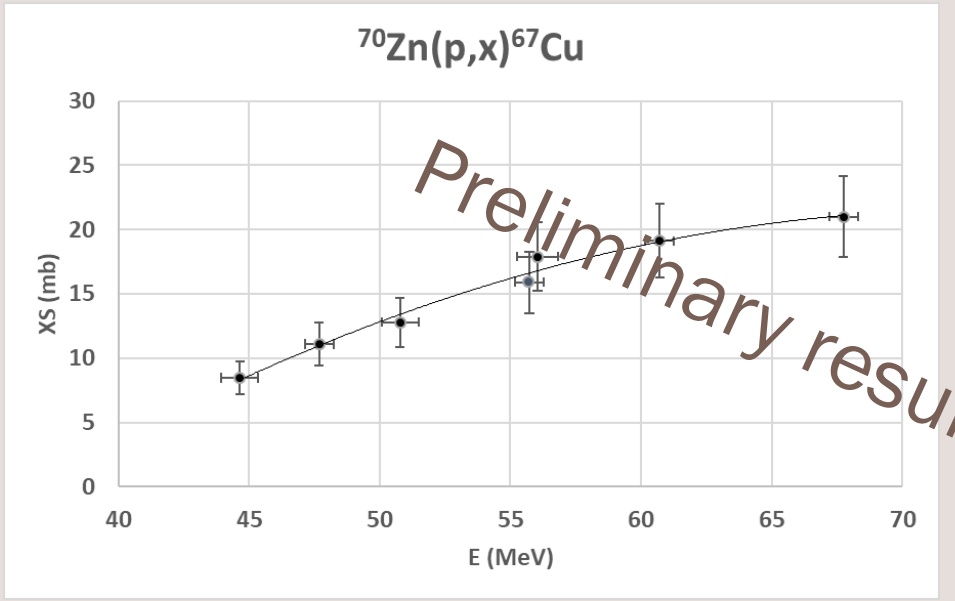


^{67}Cu

Research results

✓ Comparison with the nuclear reaction on ^{68}Zn





→ Estimation of best irradiation condition for production (preclinical applications)

^{47}Sc

PASTA

Production with Accelerators of Sc-47 for Theranostic Applications

INFN Project 2017 – 2018 (Grant Giovani CSN5)

Research results

^{47}Sc

PASTA

- Cross section measurement with ^{nat}V , ^{48}Ti and $^{49/50}Ti$ targets ongoing (Arronax)
- Thin target of enriched material produced by HIVIPP
- Study of radiochemical process for Sc/Ti separation

→ Estimation of best irradiation condition for production with proton cyclotrons (preclinical applications)

^{67}Cu

FUTURE INTEREST

- ✓ Development of a high-power targets
- ✓ Optimization of radiochemical process, including development of automatic module and **recovery** of irradiated material
- ✓ Preclinical test also with the mixture **$^{64}Cu/^{67}Cu$** and $^{44}Sc/^{47}Sc$ radiopharmaceuticals

^{47}Sc