

# Un mondo a cristalli - il progetto Europeo

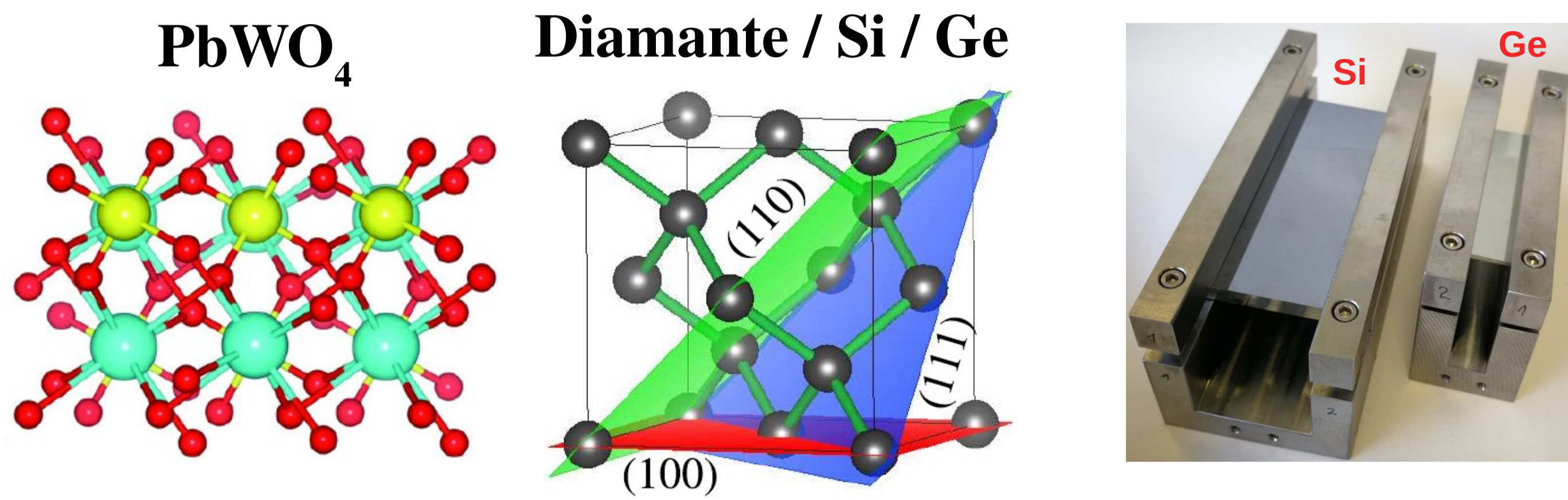


A.I. Sytov

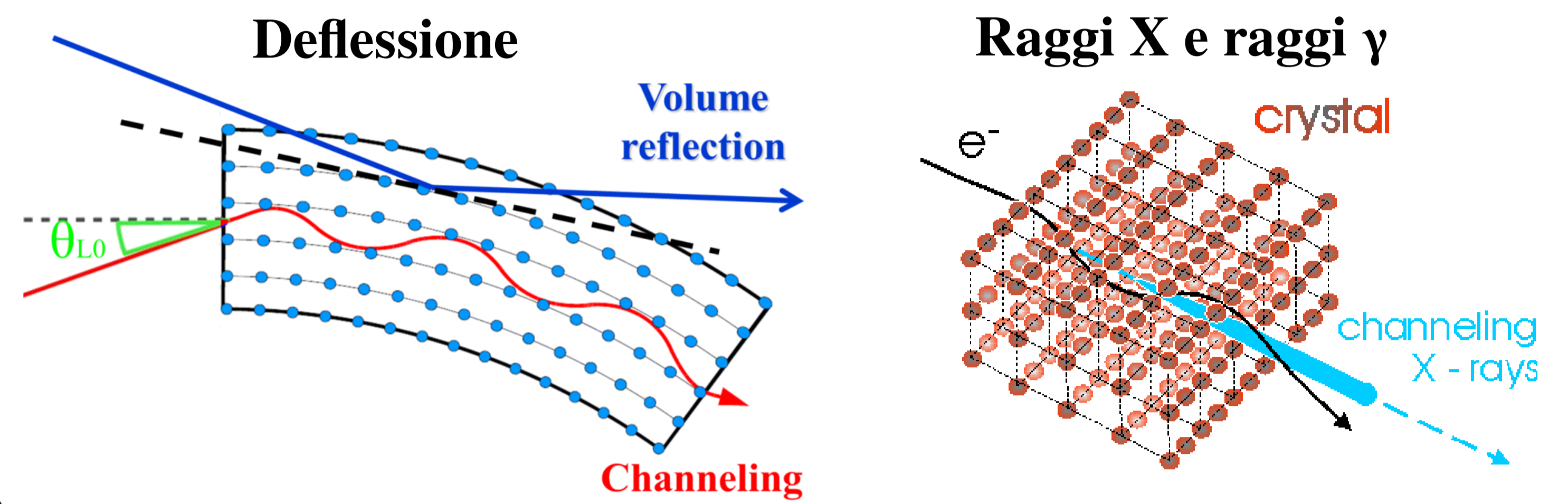
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**Un cristallo è una struttura solida geometricamente regolare costituita da atomi, molecole o ioni**

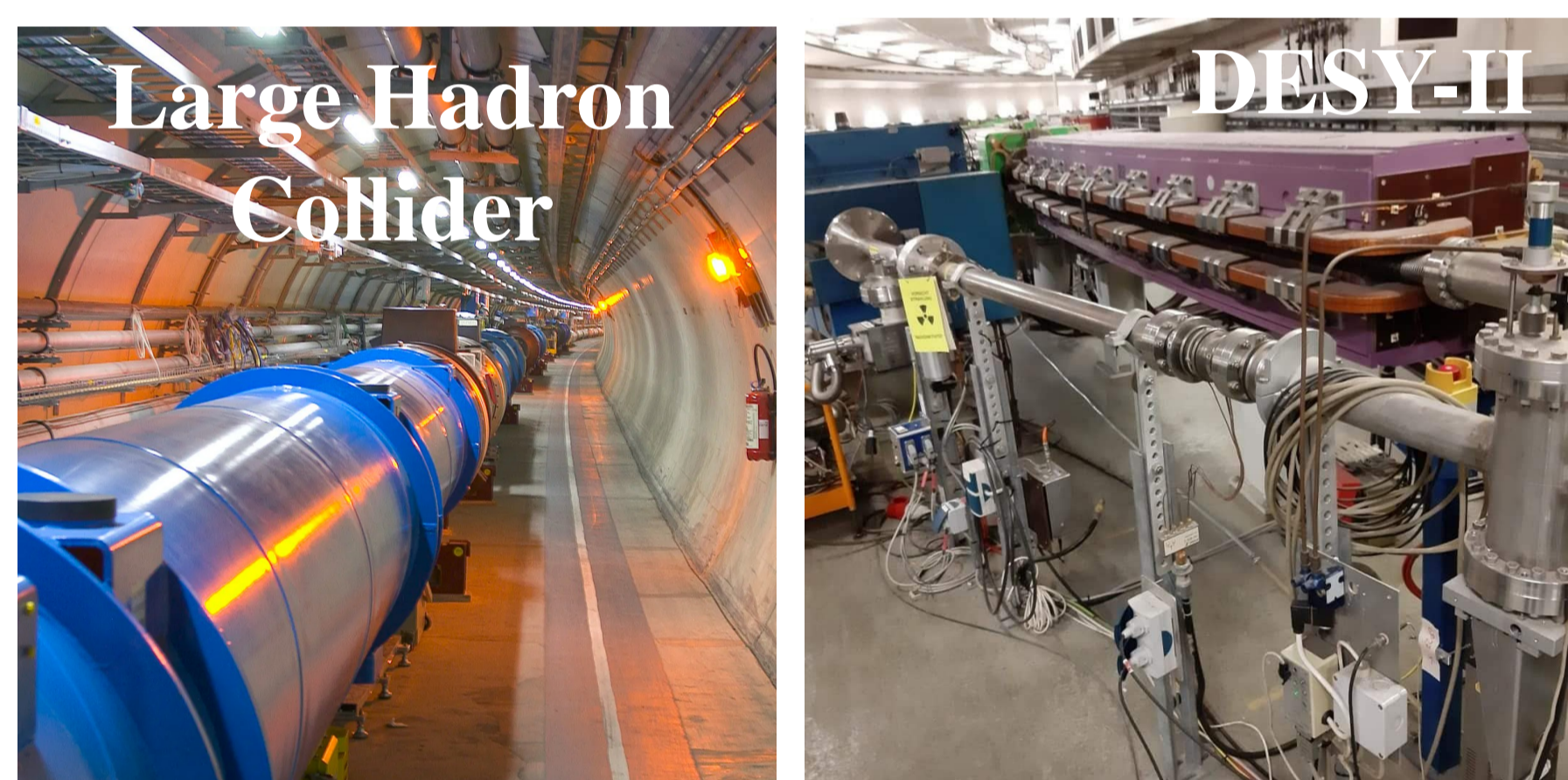
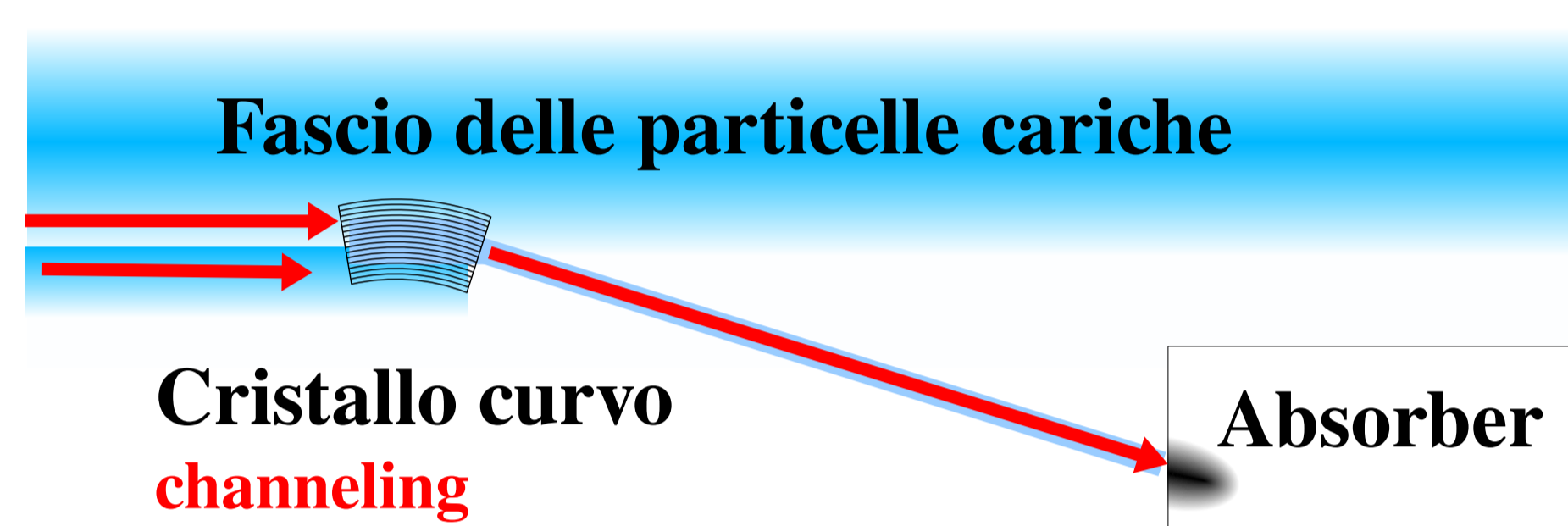


**Se una particella carica (protone o elettrone) attraversa il cristallo:**



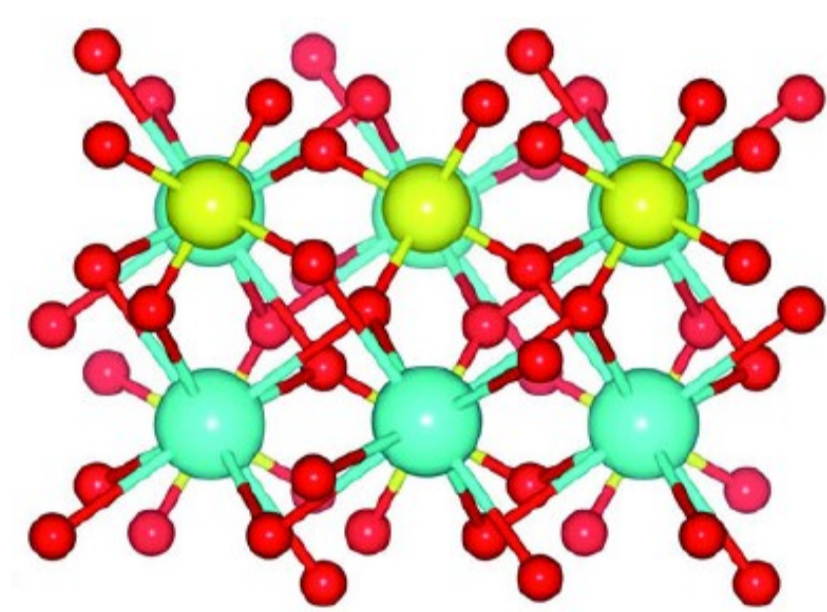
## Applicazioni del cristallo

**Collimazione o estrazione del fascio delle particelle da acceleratore**

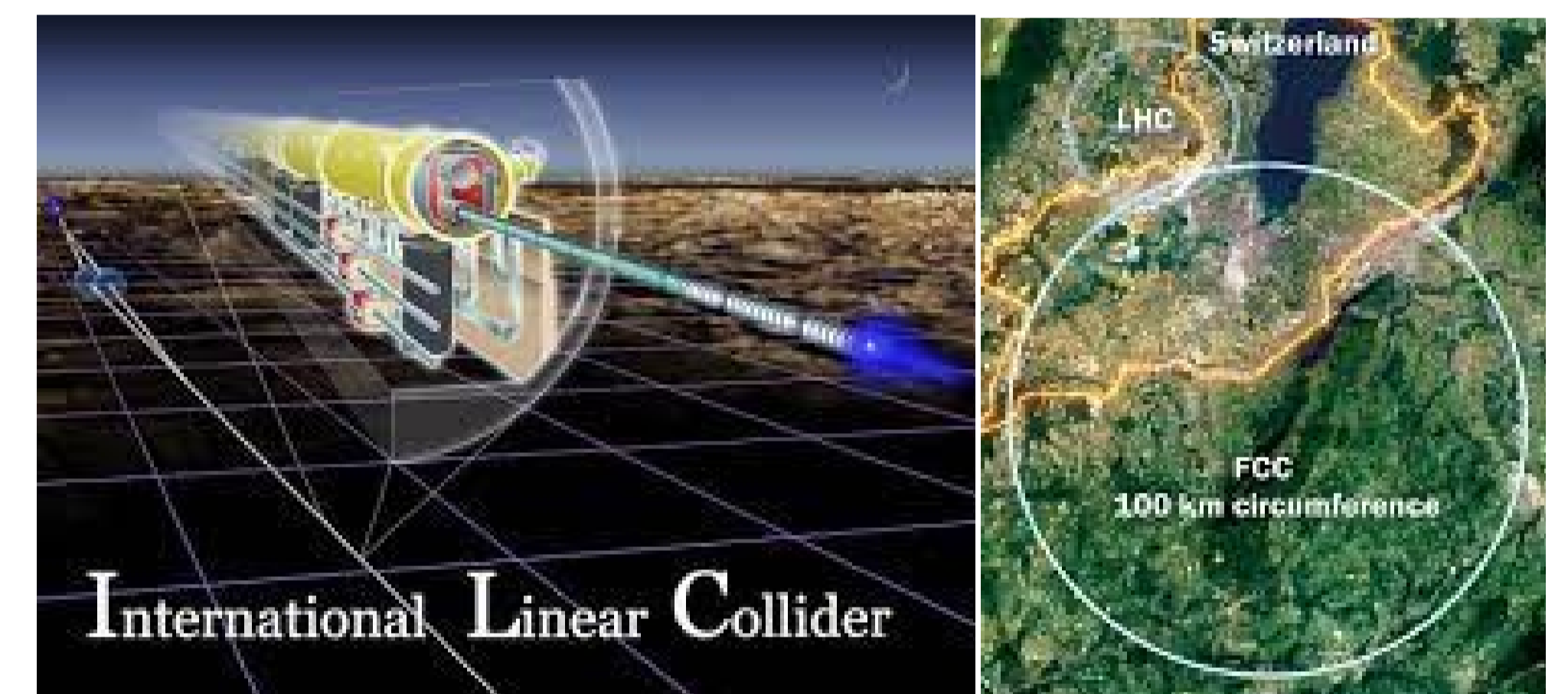
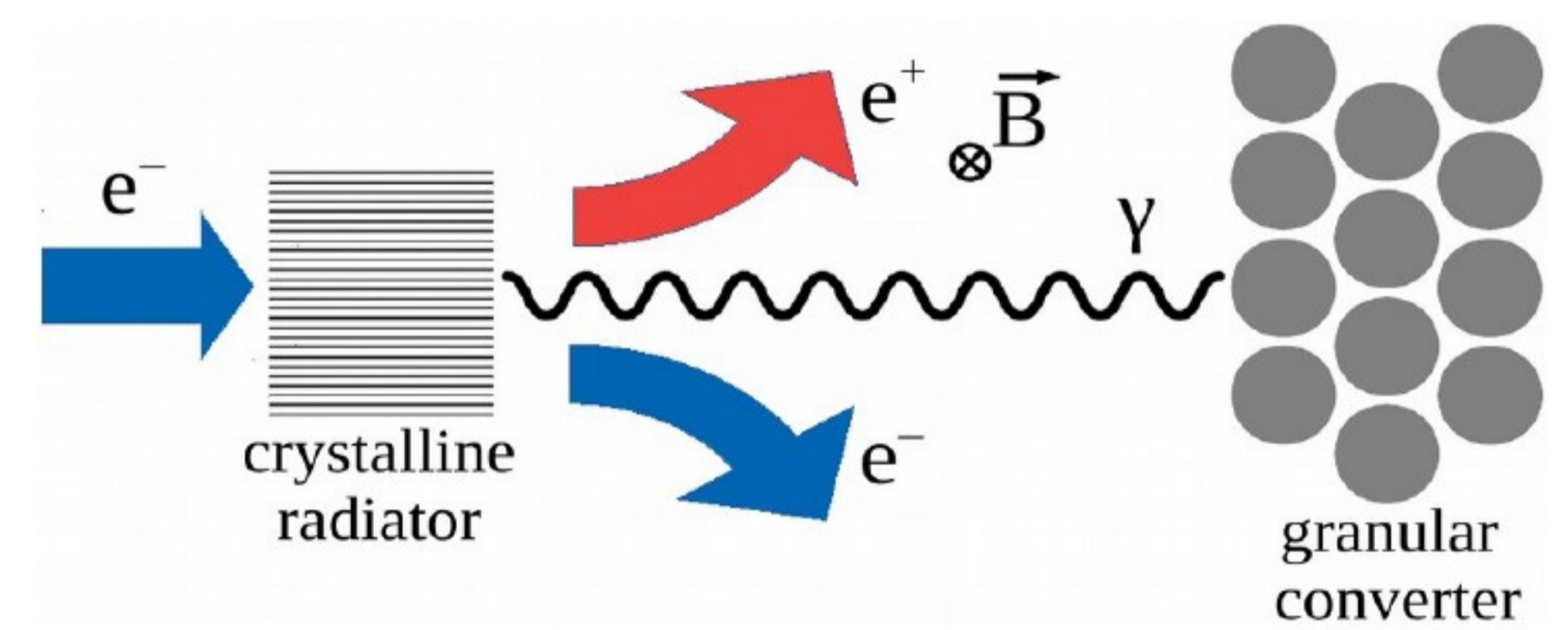


**Gamma-ray Space Telescope**

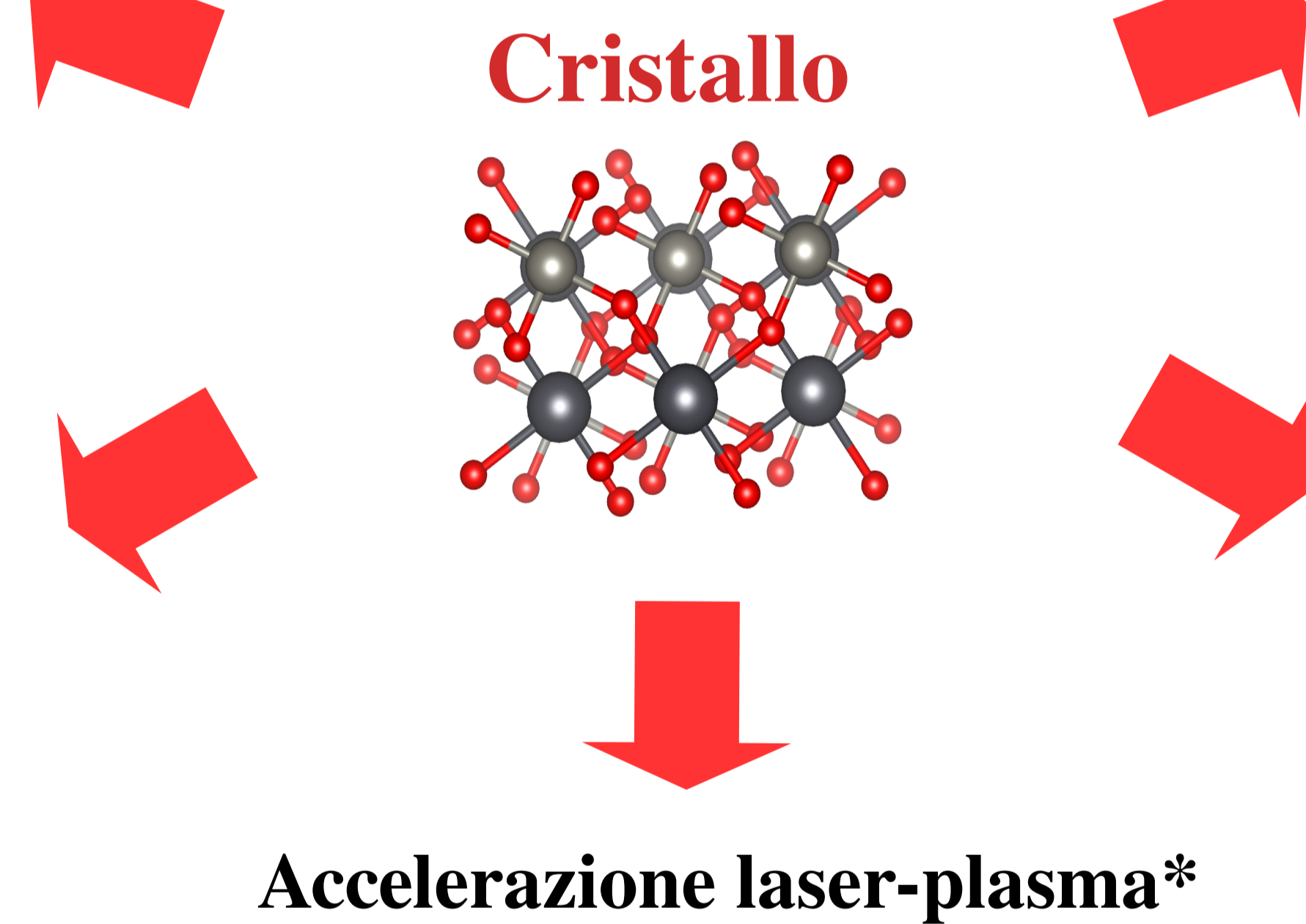
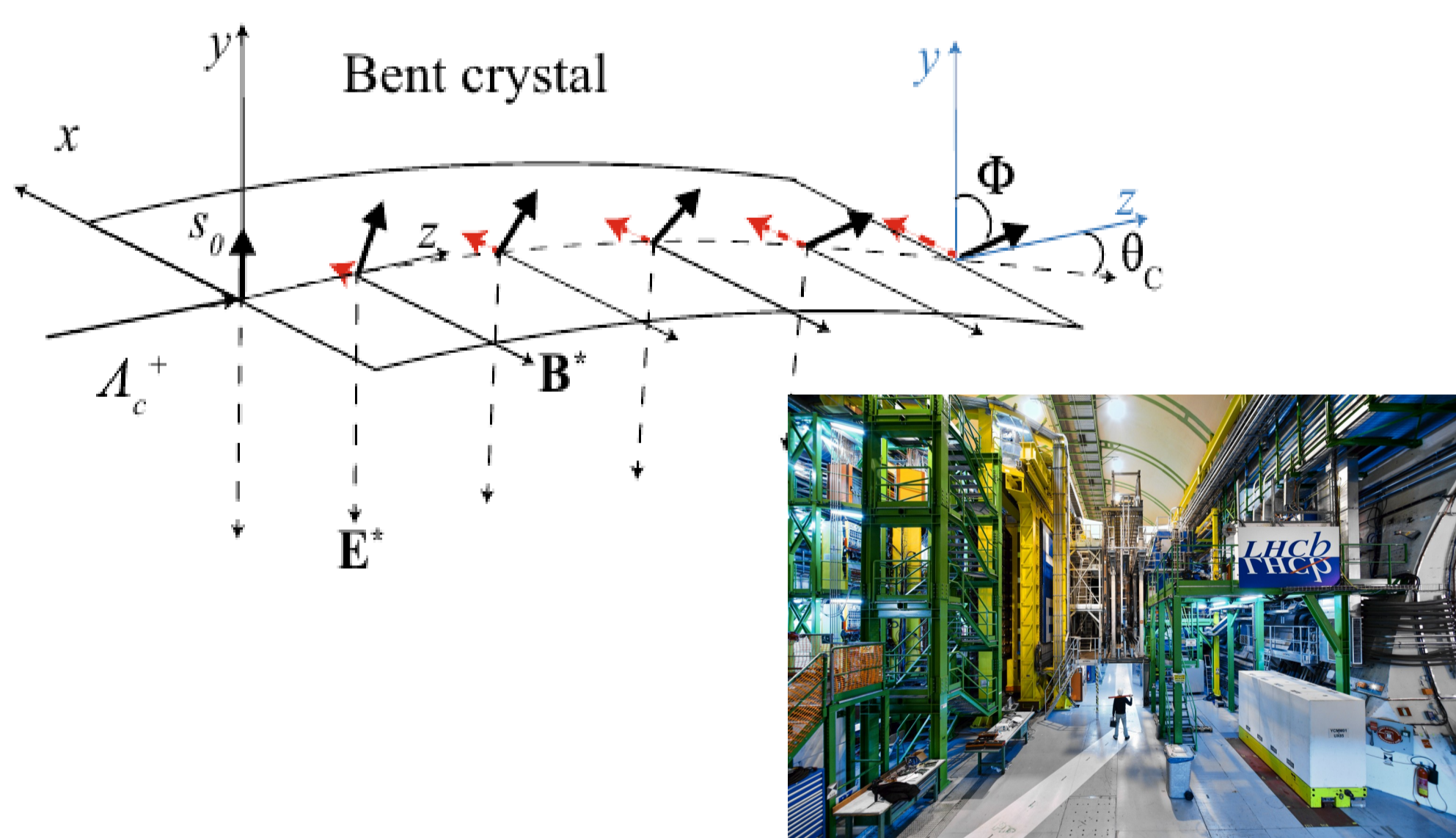
**Calorimetro innovativo per rivelare raggi  $\gamma$  cosmici**



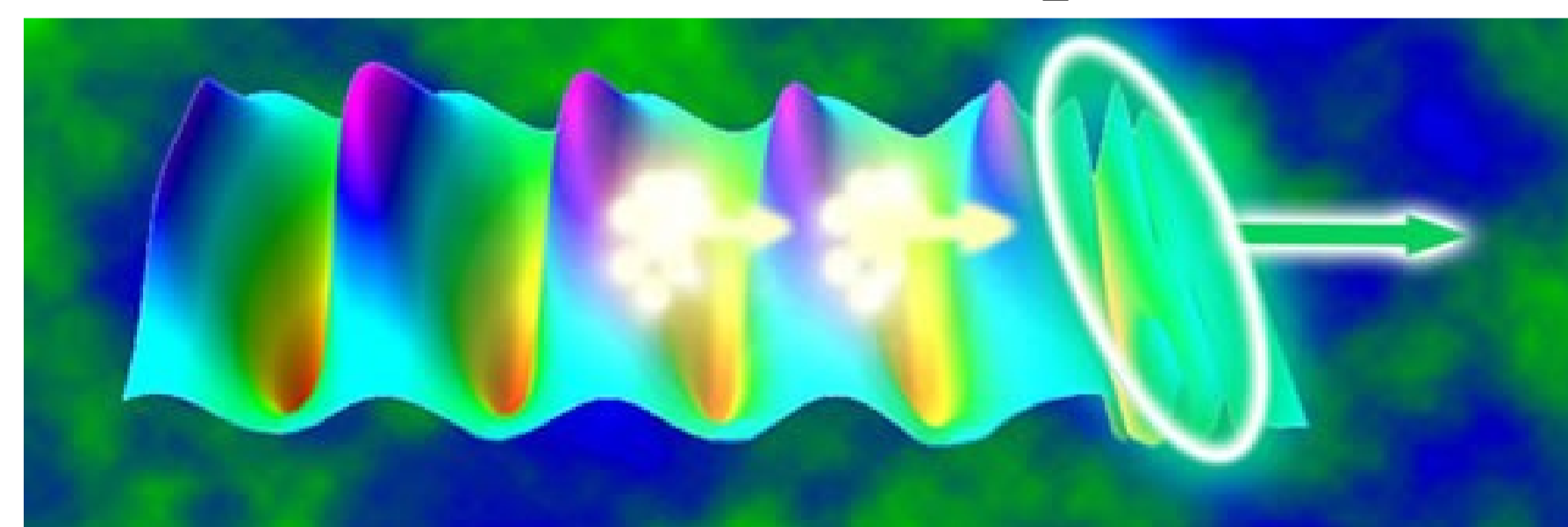
**Sorgente di positroni per i collider futuri**



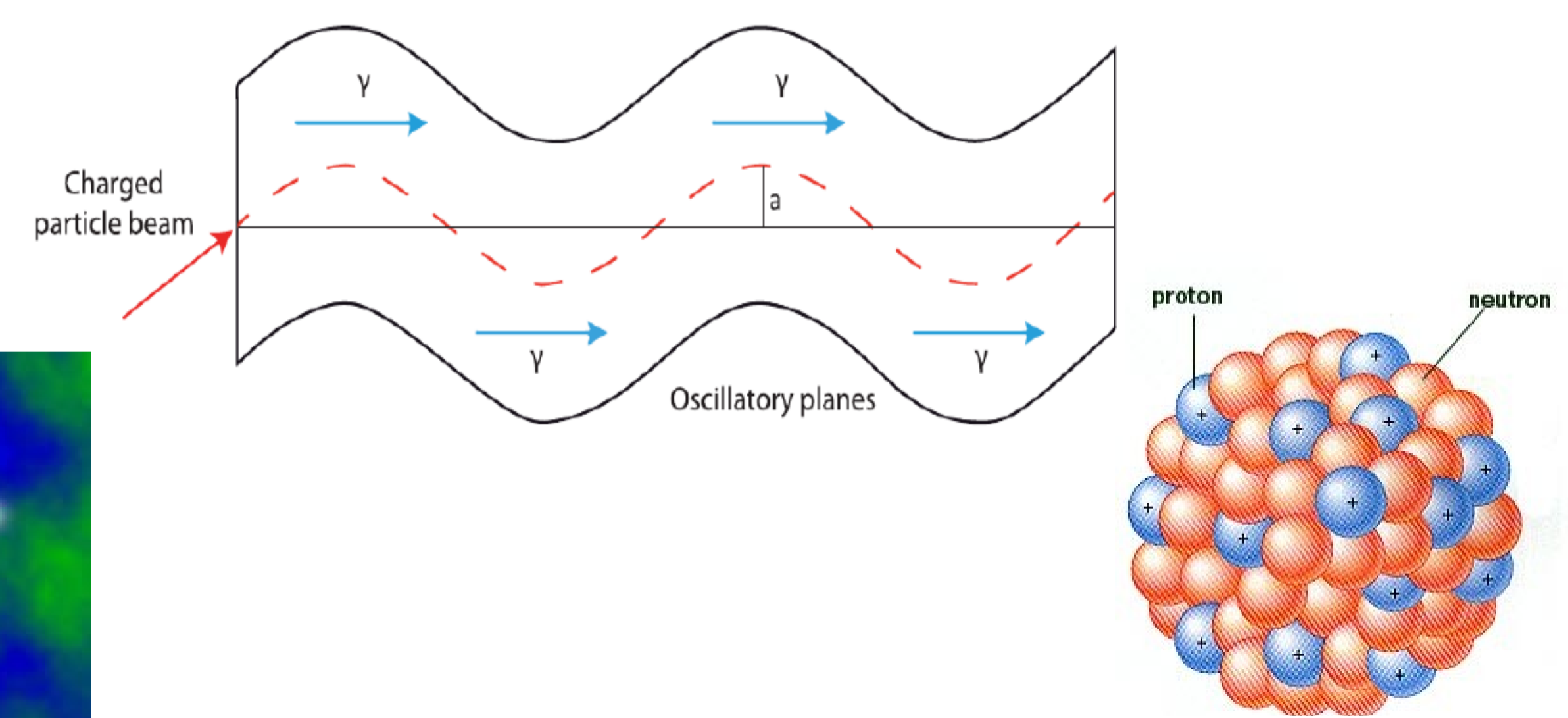
**Misure del momento di dipolo magnetico delle particelle esotiche**



**Accelerazione laser-plasma\***

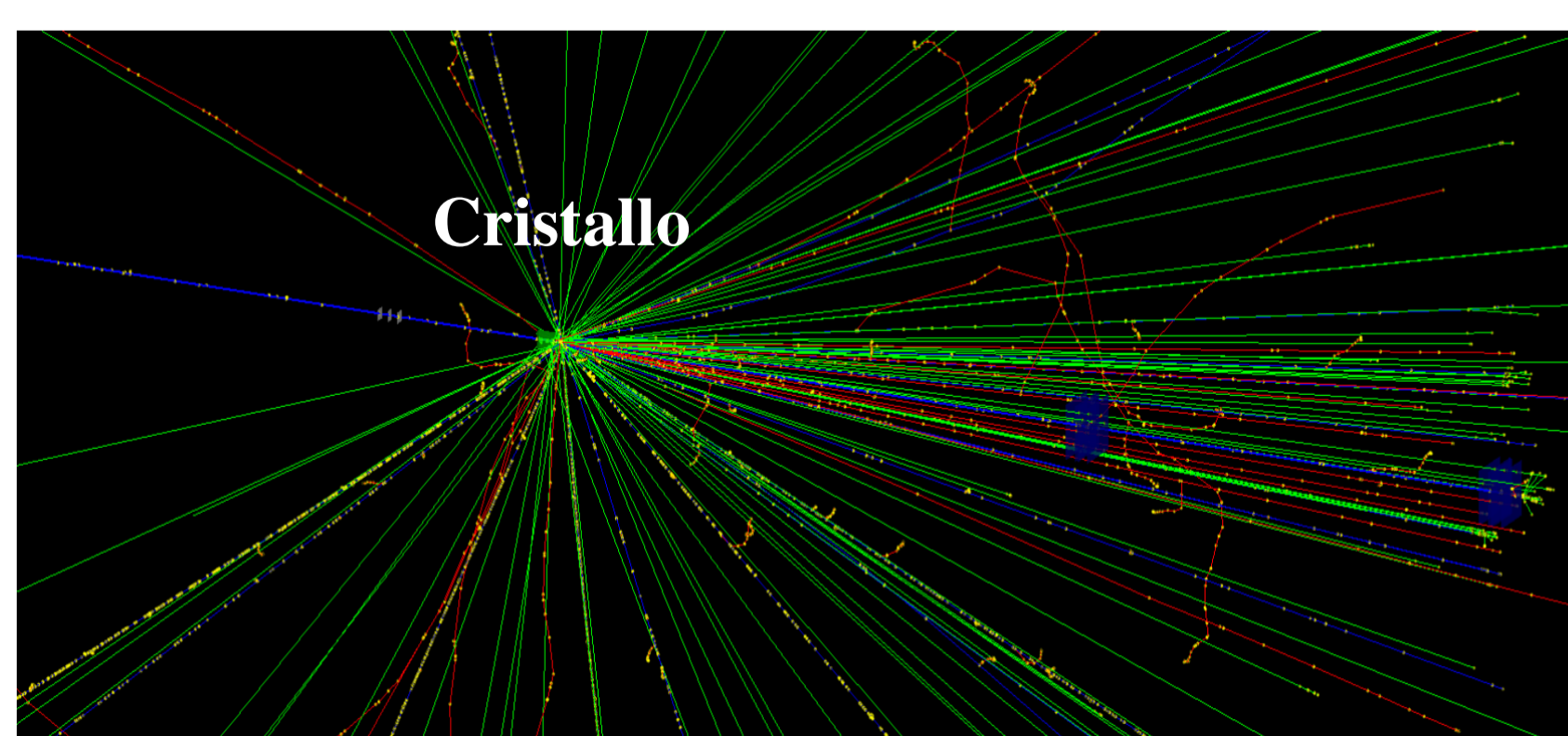


**Sorgente di raggi X e raggi  $\gamma$  per fisica nucleare e fisica medica**

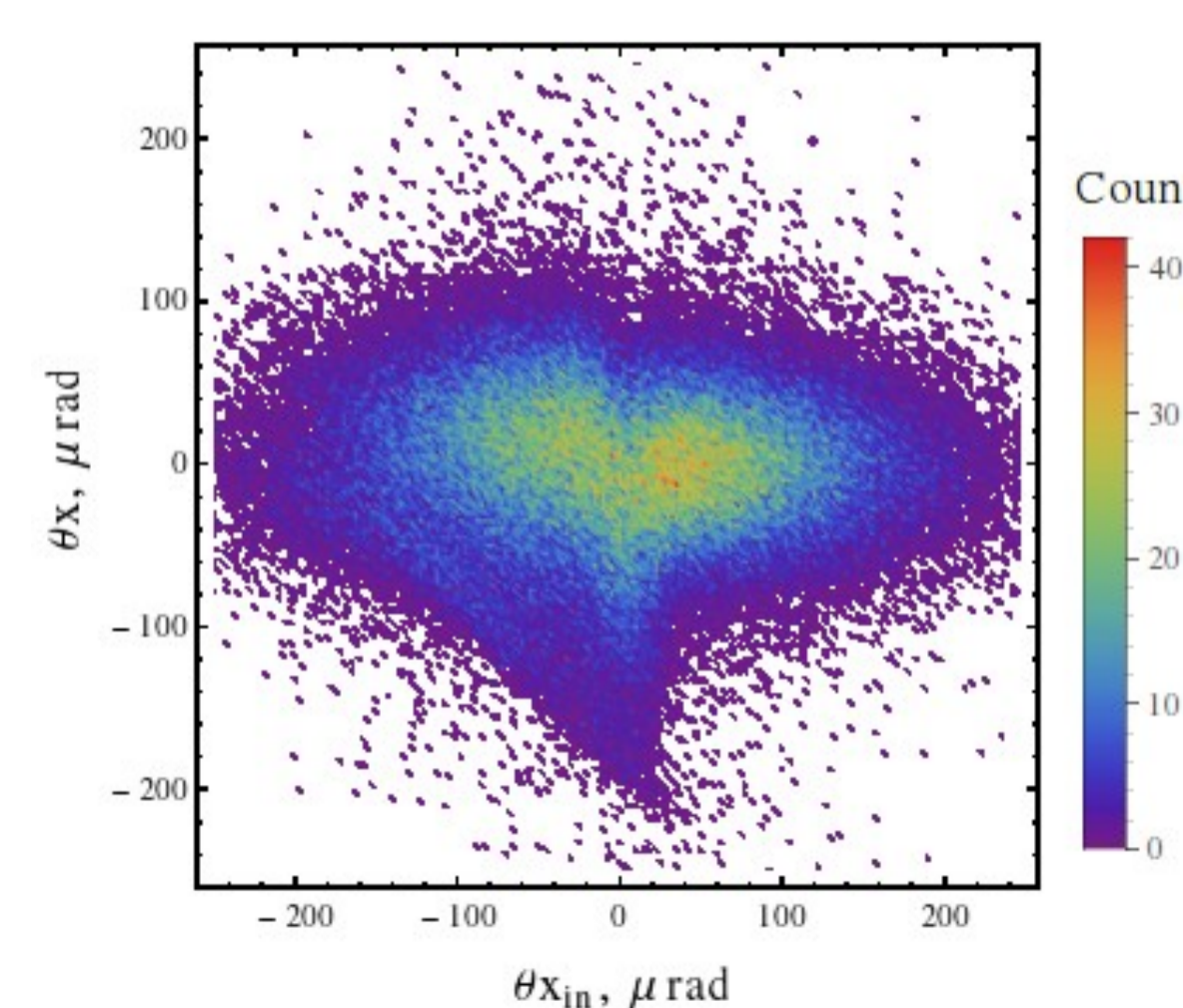


## Le simulazioni<sup>1,2</sup> con supercomputer

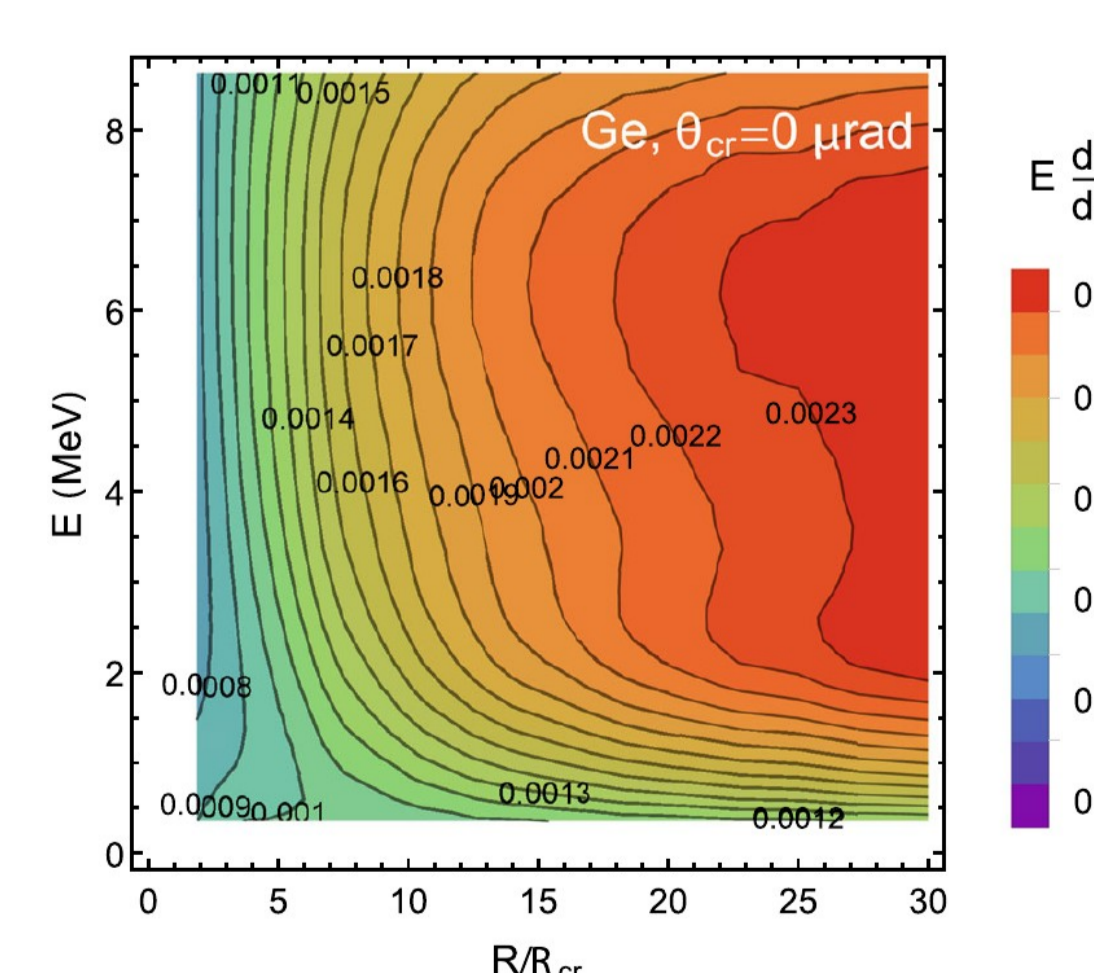
**Simulazioni con Geant4 toolkit**



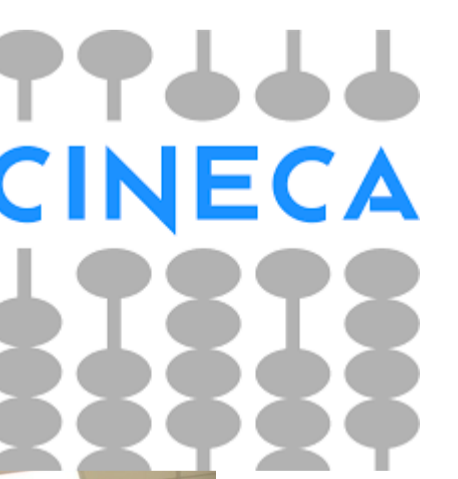
**Deflessione**



**Produzione di raggi  $\gamma$**



**Supercomputer Marconi (top 3 in EU)**



## Conclusioni

- Le particelle cariche possono essere deflesse o possono produrre raggi X e  $\gamma$  quando attraversano il reticolo cristallino.
- Questi effetti si possono applicare nella fisica degli acceleratori, fisica nucleare, fisica medica ed astronomia gamma.

## Bibliografia:

- A.I. Sytov, V.V. Tikhomirov. NIM B 355, 383–386 (2015).
- A. I. Sytov, V. V. Tikhomirov, and L. Bandiera. PRAB 22, 064601 (2019).
- L. Bandiera, A. Sytov et al. Eur. Phys. J. C 81, 284 (2021).

\* Figura: <https://www2.lbl.gov/publicinfo/newscenter/features/2008/apr/af-bella.html>  
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