Photon strengths for primary γ-rays in (n,γ)

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Primary γ-ray photon strengths

Photon strength, as defined by the statistical model community.

$$f(E_\gamma) = \sigma_\gamma \Gamma_\gamma / (\sigma_0 \cdot d_0 \cdot E_\gamma^3)$$

E_γ= primary γ-ray energy (MeV)

Γ_γ = capture state width (eV)

σ_γ = primary γ-ray cross section (b)

σ_0 = total radiative neutron cross section (b)

d_0 = average level spacing at S_n (eV)

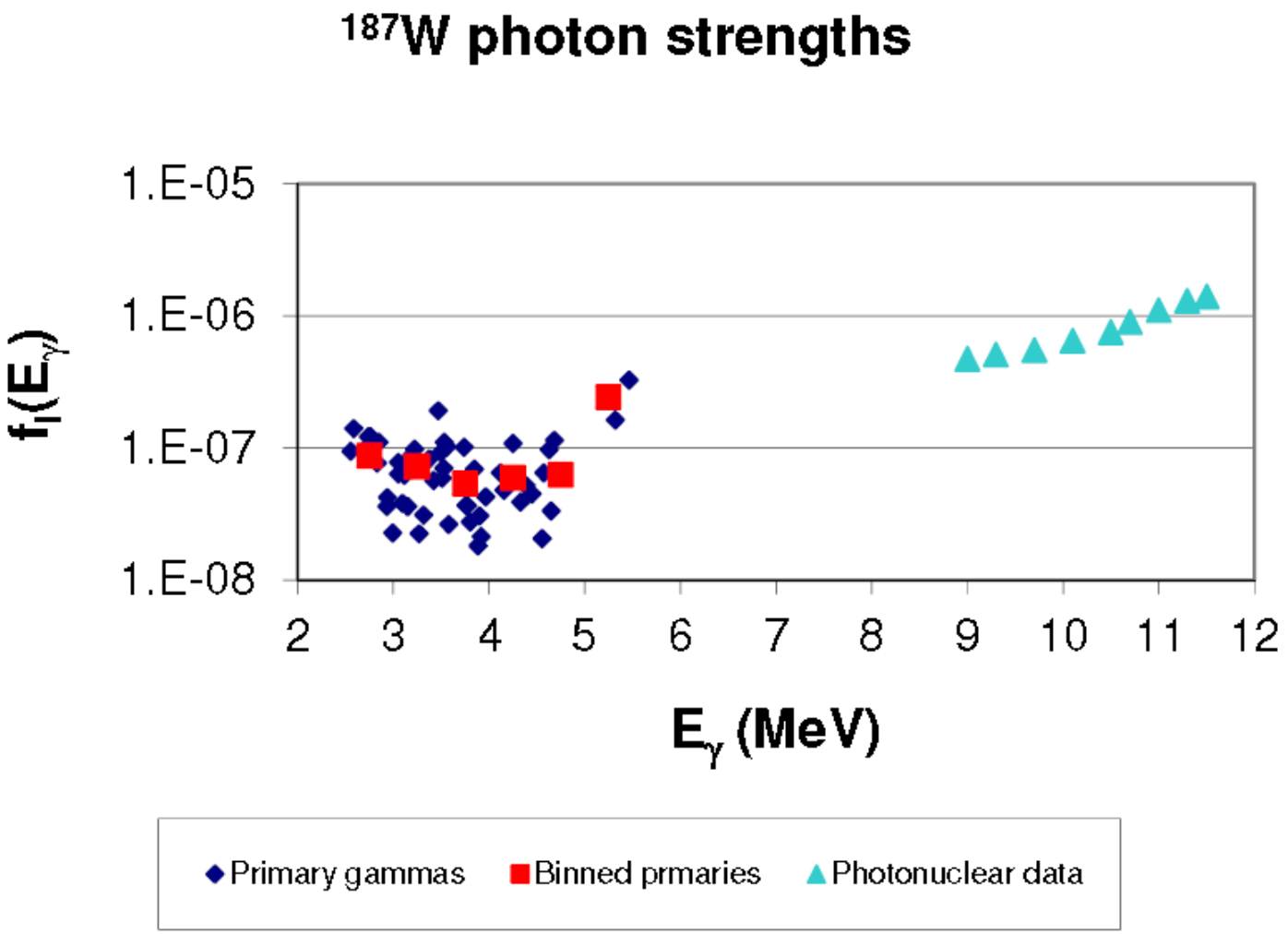
Data sources

E_γ- EGAF or ENSDF

$\Gamma_\gamma, \sigma_0, d_0$- *Atlas of Neutron Resonances*

σ_γ- EGAF

Example for thermal (n,γ)



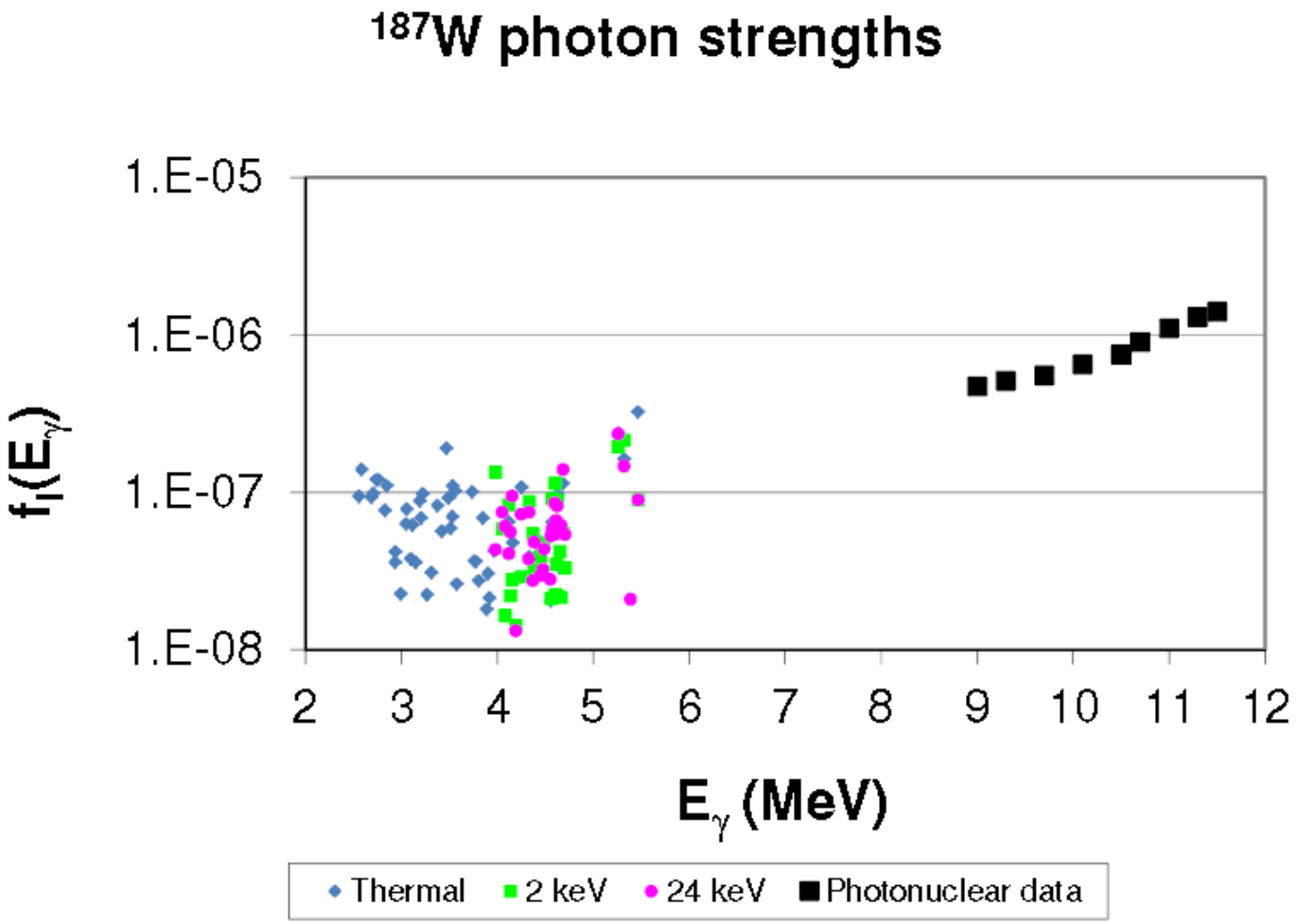
Average Resonance Capture Data

A similar determination of γ-ray photon strengths can be done for Average Resonance Capture data assuming

1. The primary γ-ray intensity per 100 neutron captures is known.
2. The level width Γ_γ is the same as for the thermal capture state (good assumption)

$$f(E_\gamma) = I_\gamma \Gamma_\gamma / (100 \cdot d_0 \cdot E_\gamma^3)$$

Example for Average Resonance Capture



Recommendation

ENSDF evaluators should determine either photon strengths $f(E_\gamma)$ or B(E,M:λ) for primary γ-rays from thermal and ARC datasets.