

Incontri di fisica delle alte energie
Marzo 2016

Ricerca di materia oscura leggera con CRESST-III

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1 Approccio sperimentali

- Canali di interazione
- Ricerca diretta

2 La tecnica di CRESST

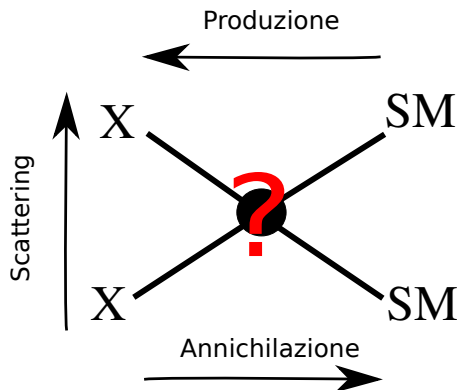
- I moduli
- Discriminazione degli eventi

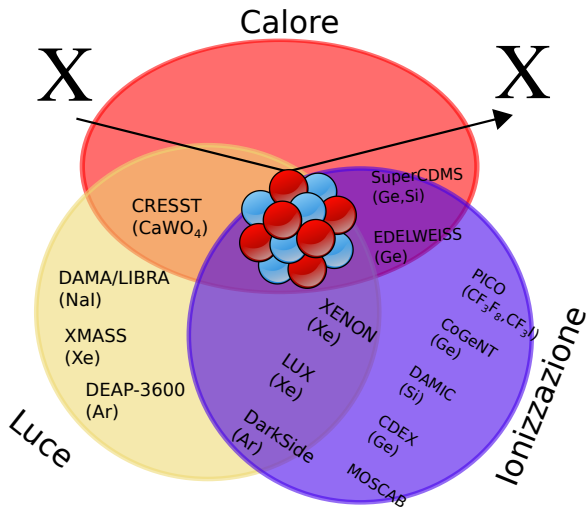
3 CRESST II

- Ultimo risultato
- Soglia di energia

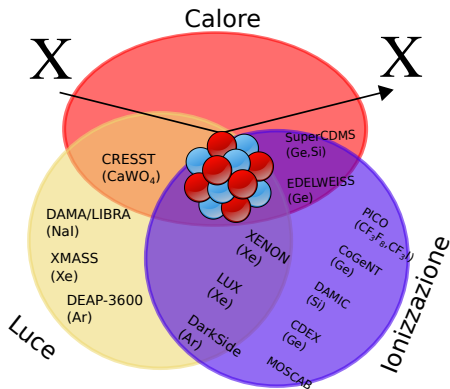
4 CRESST III

- Idea
- Prototipo
- Proiezioni

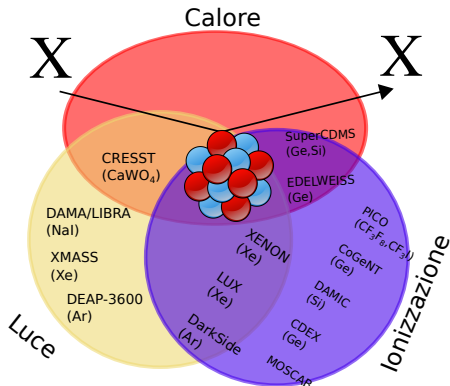




- Scattering su nuclei
- Scattering elastico
- Interazione coerente ($\sigma \sim A^2$)
- (Spin indipendente)

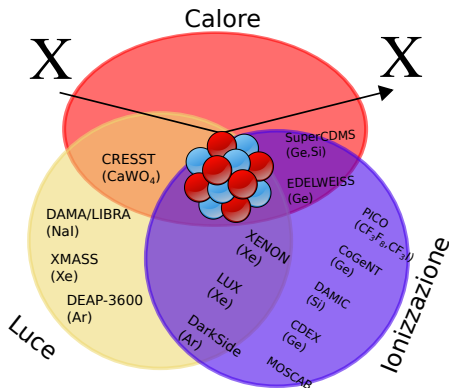


- Scattering su nuclei
- Scattering elastico
- Interazione coerente ($\sigma \sim A^2$)
- (Spin indipendente)



Il rate di interazione e la forma dello spettro forniscono la sezione d'urto di interazione e la massa delle particelle

- Scattering su nuclei
- Scattering elastico
- Interazione coerente ($\sigma \sim A^2$)
- (Spin indipendente)

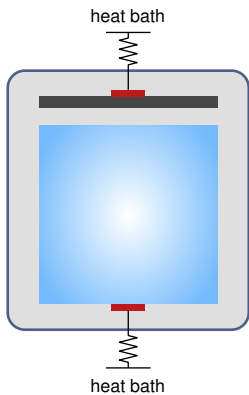


Qualche numero

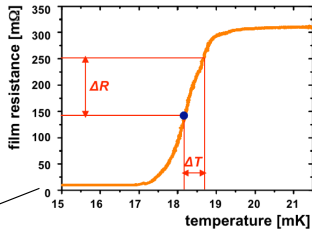
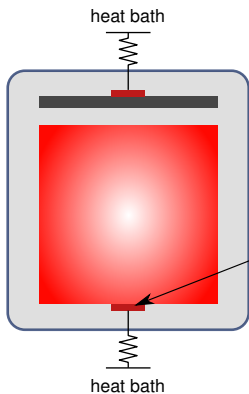
$$m_\chi = 100 \text{ GeV} \quad \rho_\chi = 0.3 \text{ GeV}/\text{cm}^3 \quad \sigma_0 = 10^{-42} \text{ cm}^2$$

$$A = 131(\text{Xe}) \quad E_{th} = 40 \text{ keV} \Rightarrow R \simeq 10^{-1} \text{ counts/kg/day}$$

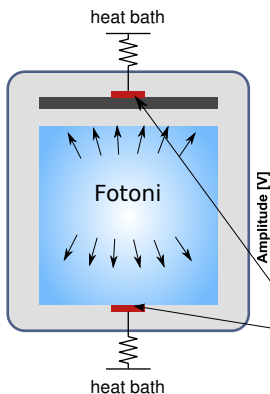
Un modulo di CRESST



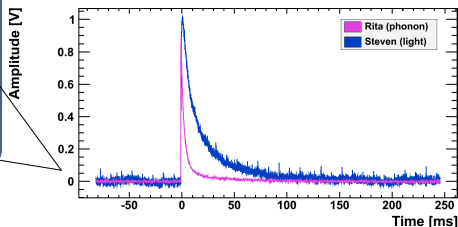
Un modulo di CRESST



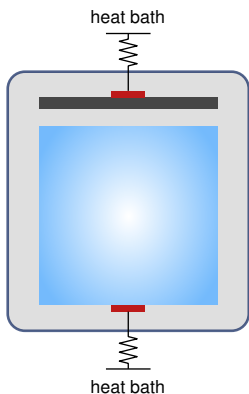
Un modulo di CRESST



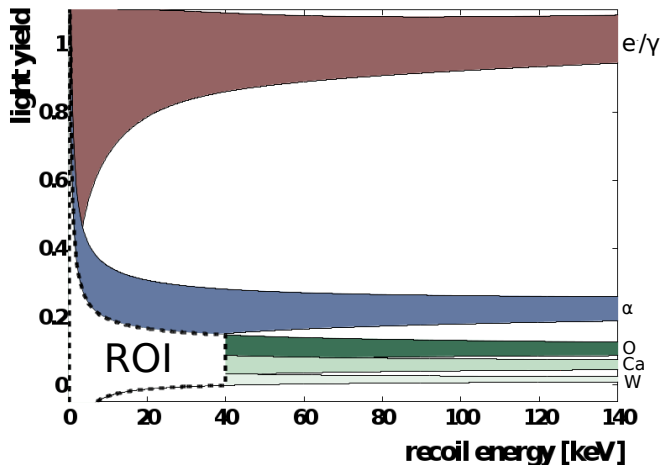
- Incremento della temperatura dell'assorbitore: misura dell'energia depositata



Un modulo di CRESST

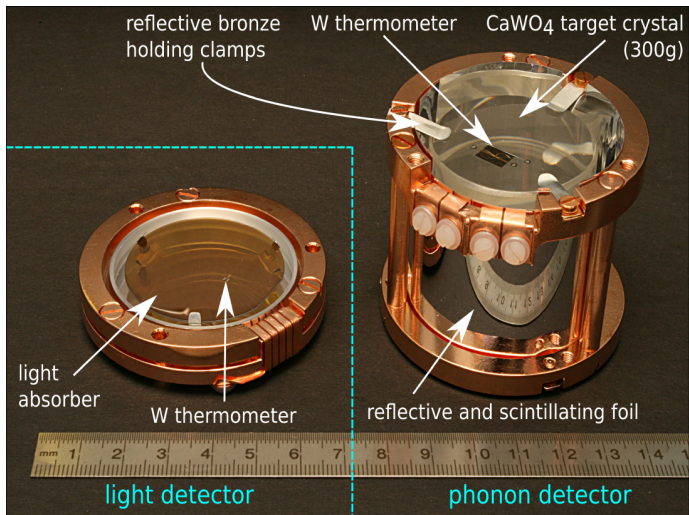


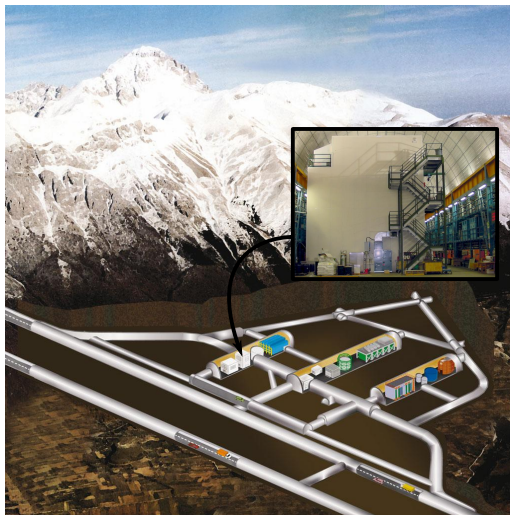
- Incremento della temperatura dell'assorbitore: misura dell'energia deposta
- Doppio canale di lettura: discriminazione evento per evento



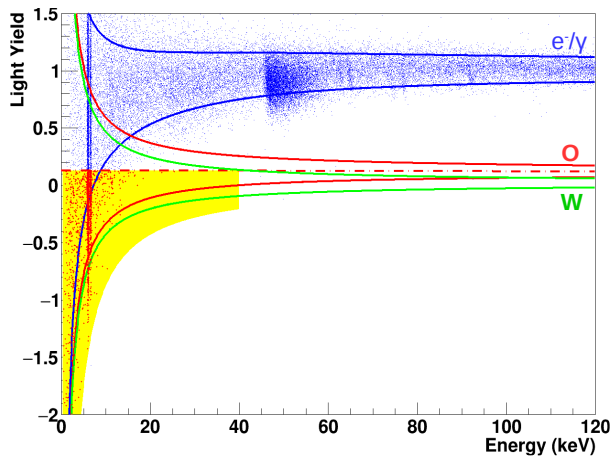
$$\text{Light Yield} = \frac{\text{Ampiezza segnale di luce}}{\text{Ampiezza segnale termico}}$$

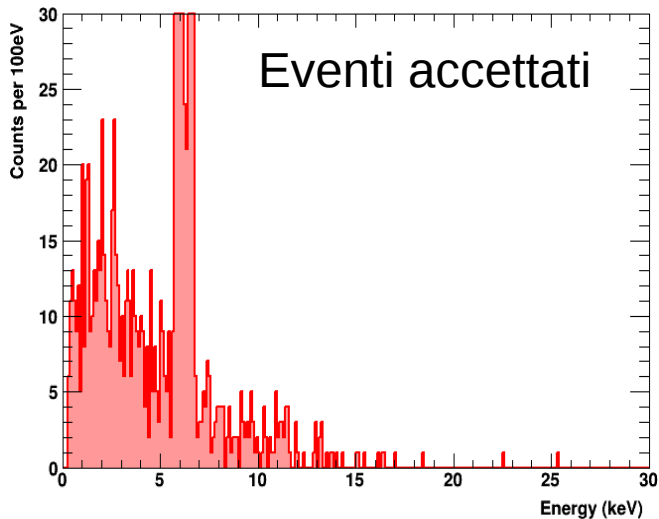
Un modulo di CRESST

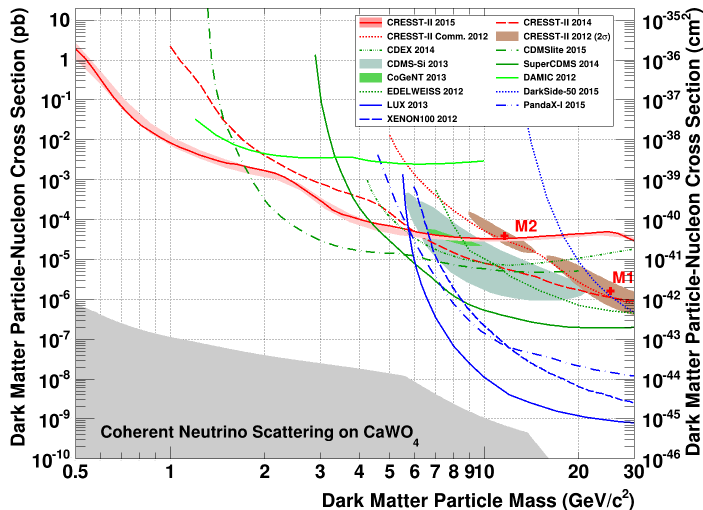


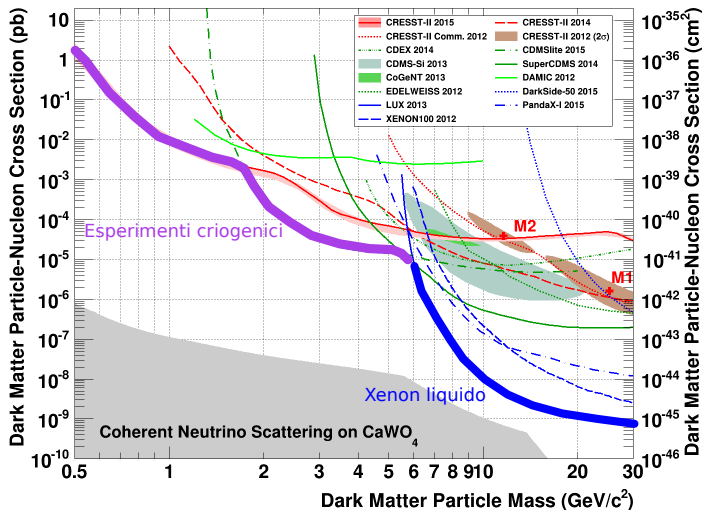


Selezione degli eventi

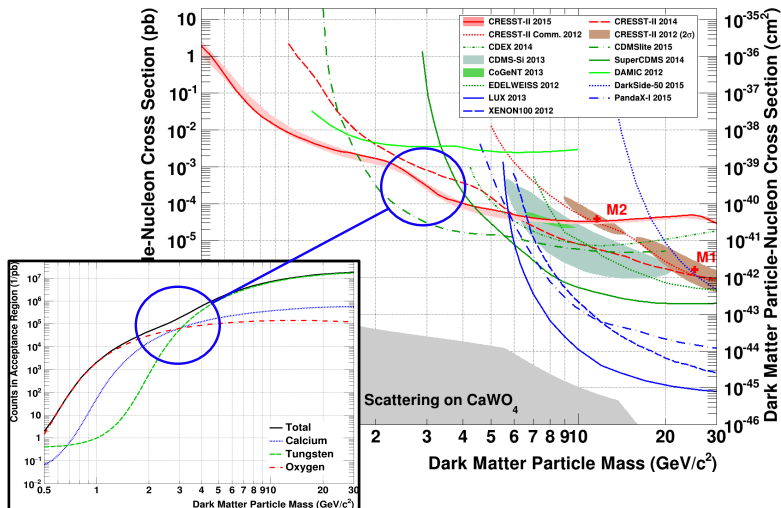




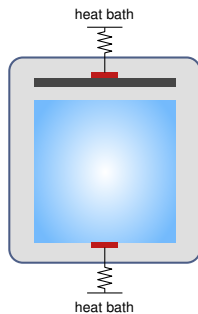




Assorbitore multi-target

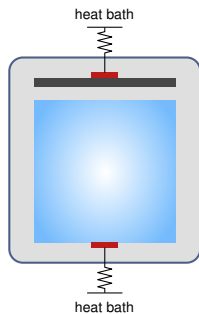


Rivelatore CRESST III - idea

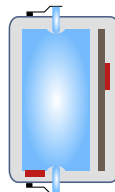


Massa $\sim 300\text{g}$

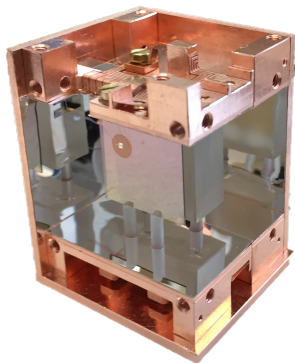
Soglia $\sim 300\text{eV}$



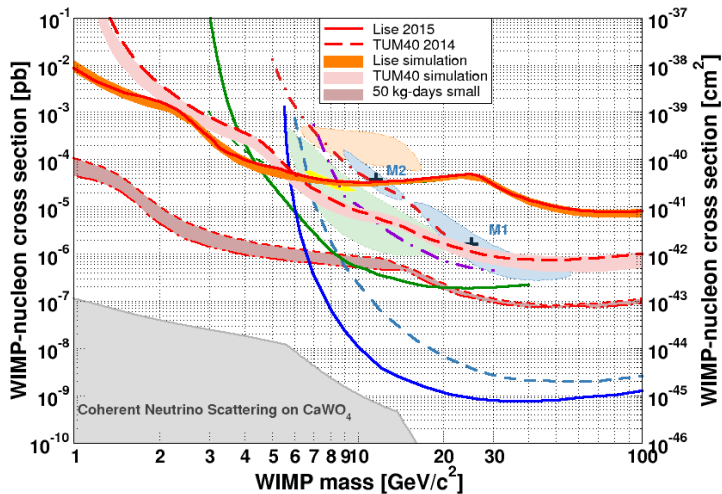
Massa $\sim 300\text{g}$
Soglia $\sim 300\text{eV}$

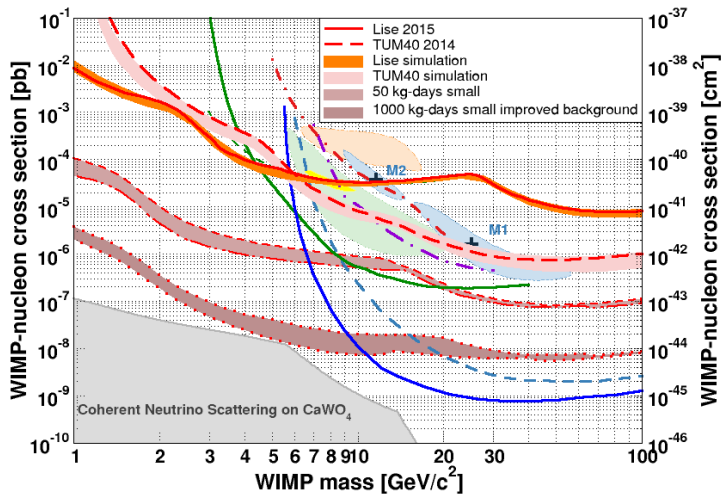


Massa $\sim 24\text{g}$
Soglia $\sim 100\text{eV}$

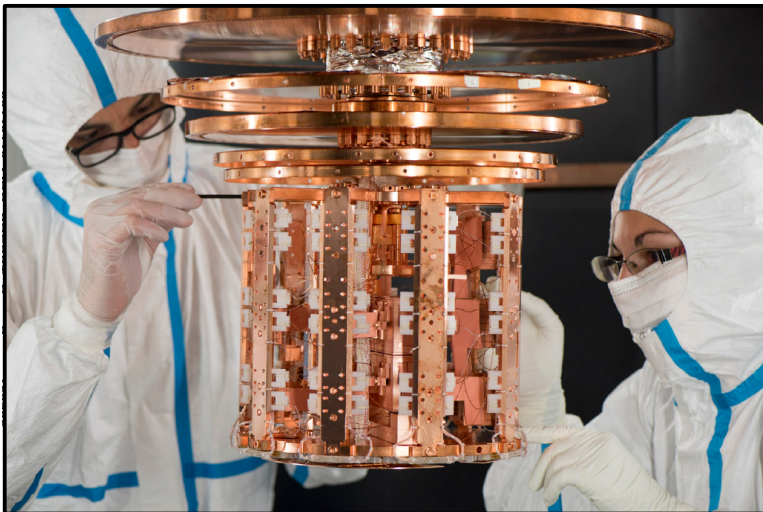


Soglia = 60eV





Inizio del nuovo run: a giorni!



Grazie dell'attenzione
Grazie ad Astrid per la foto!