



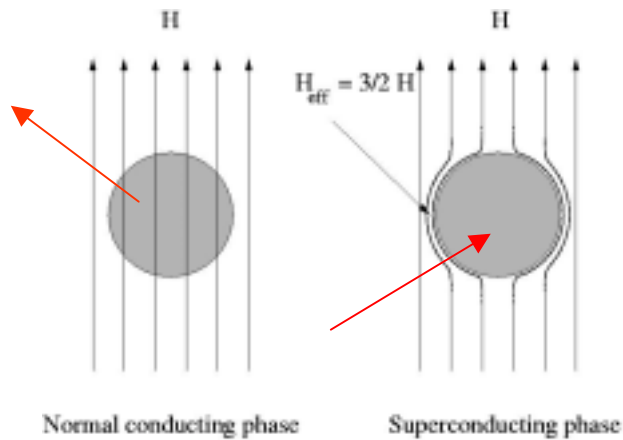
# Results from the ORPHEUS dark matter detector

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S. Janos, P. Loaiza, U. Moser, K. Pretzl,  
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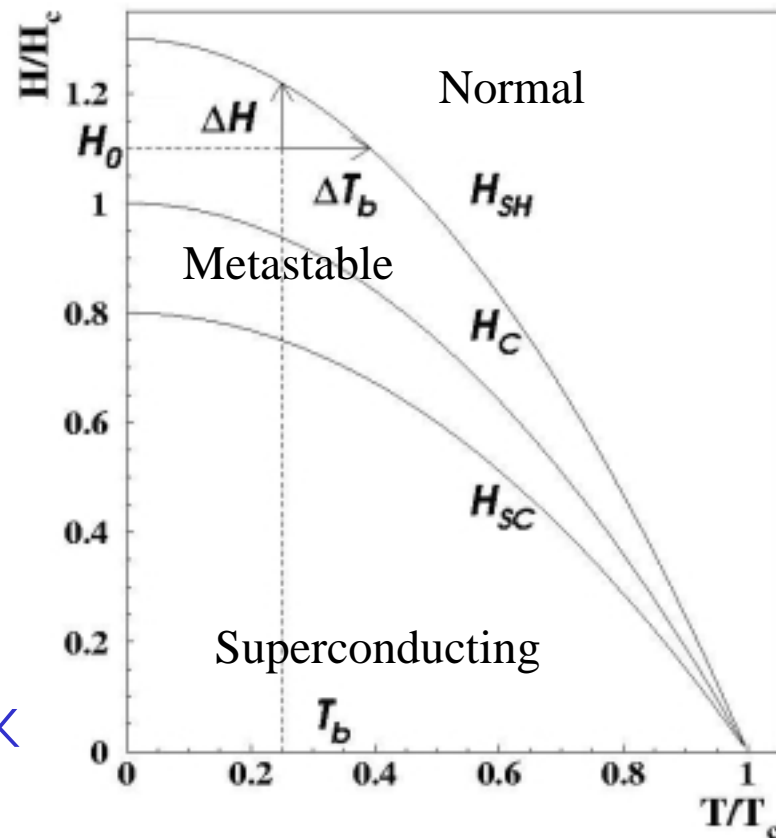
*LTD10, Genoa 2003*

# A superconducting Sn granule detector



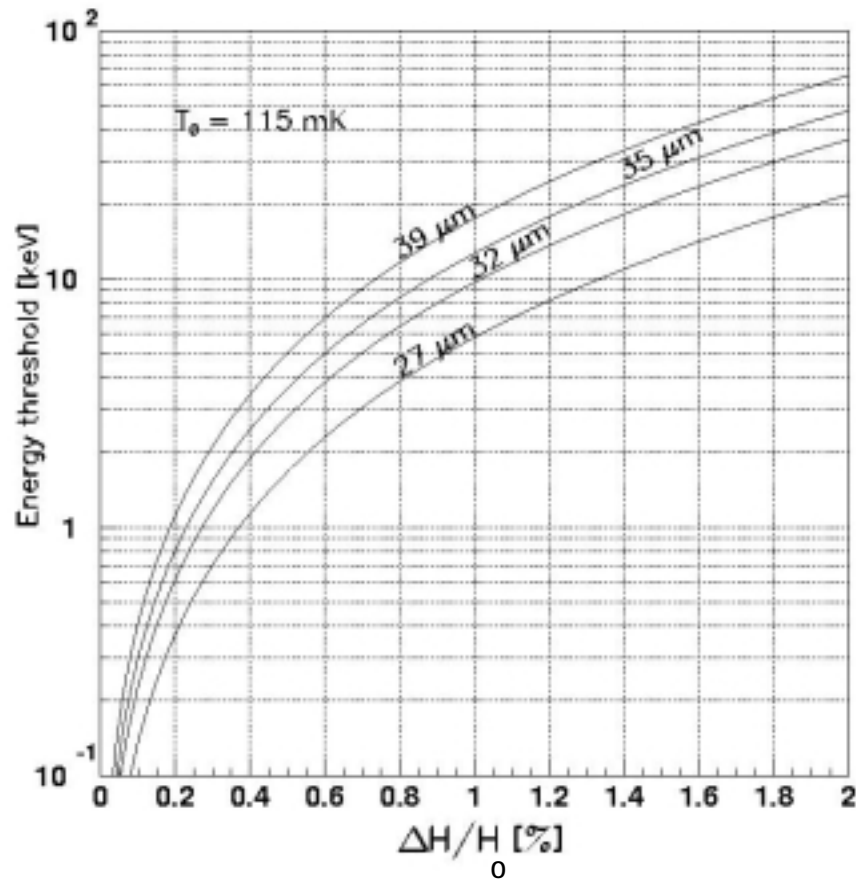
An energy deposition of 1 keV produces a temperature increase of 100 mK .  
 (bath temp. = 110 mK,  
 gran. diam= 35  $\mu\text{m}$ )

$$T_c = 3.72 \text{ K}$$

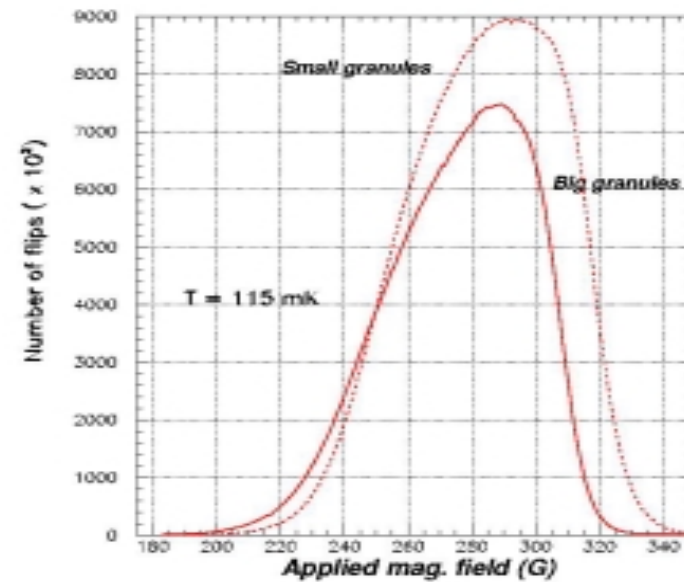


Results from the ORPHEUS dark matter detector

# Energy threshold



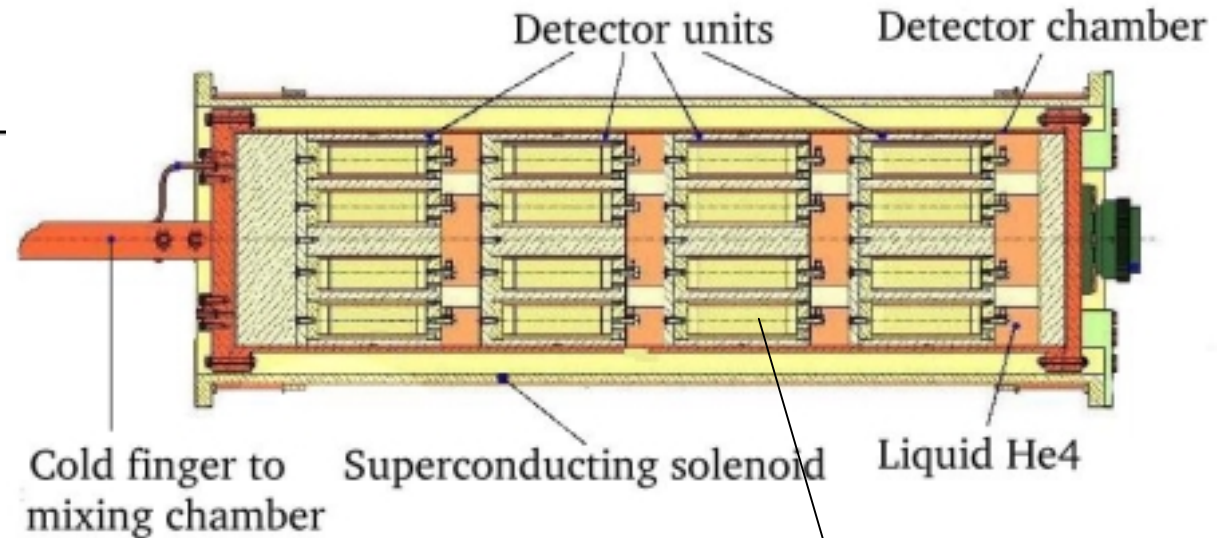
Superheating field distribution:



Results from the ORPHEUS dark matter detector

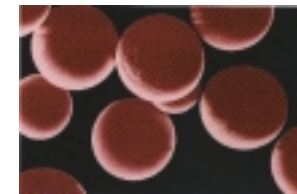
# The experiment

56 pick-up coils: half with granules with 24-32  $\mu\text{m}$  diameter and half with 34-39  $\mu\text{m}$



Total mass=450 g

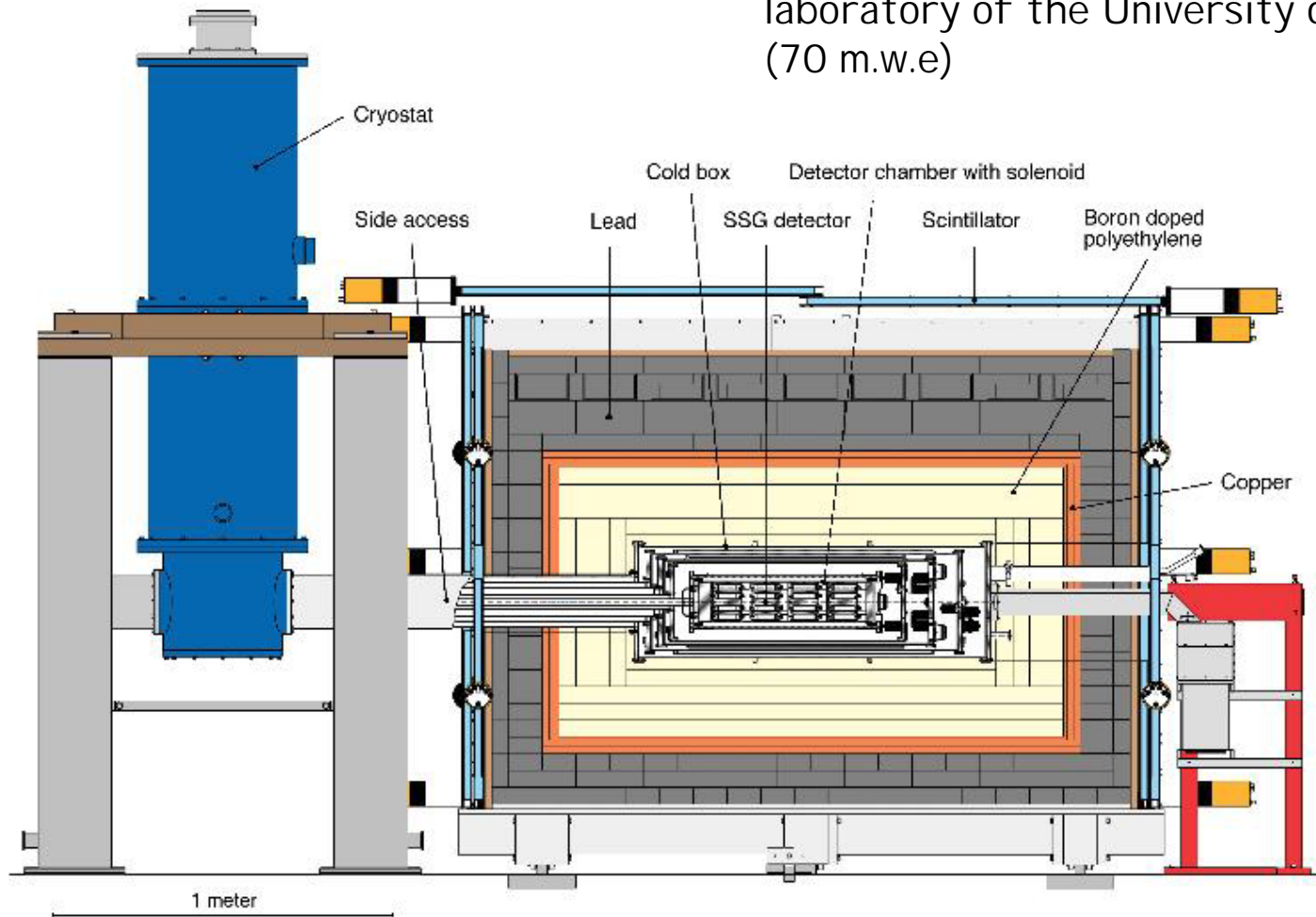
Inside each coil, there is a mixture of Tin with dielectric Teflon (with a volume filling factor of 10 % of Tin).



Results from the ORPHEUS dark matter detector

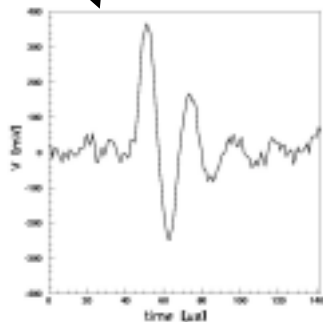
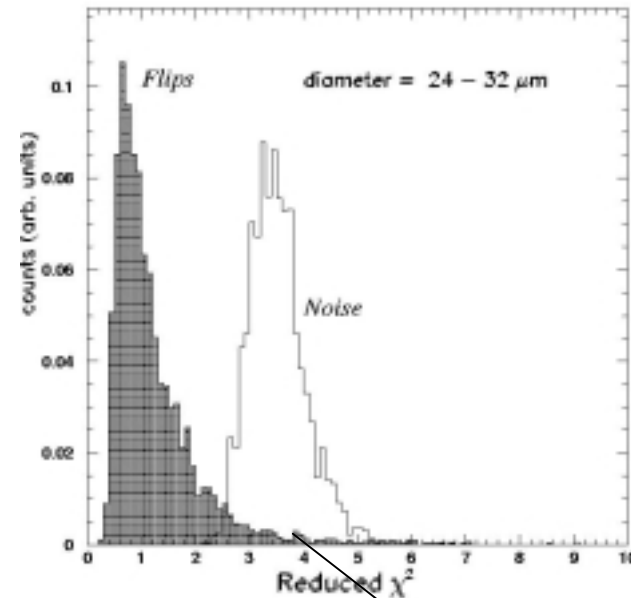
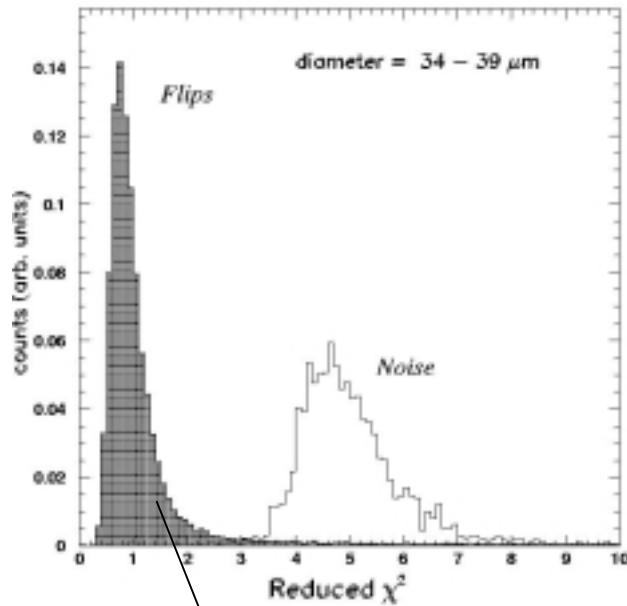
# Experimental setup

ORPHEUS is located in the underground laboratory of the University of Bern (70 m.w.e)

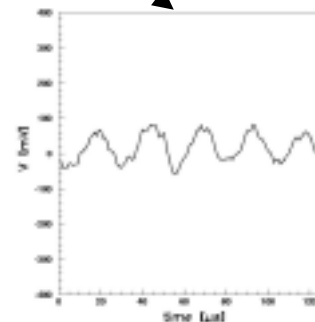


Results from the ORPHEUS dark matter detector

# Electronic noise discrimination



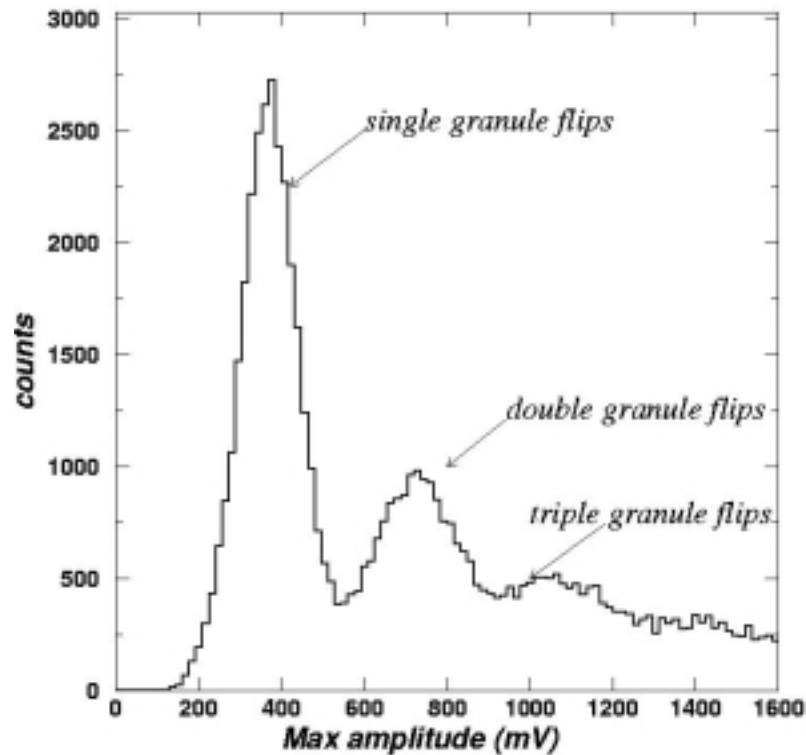
Pulse-shape  
discrimination



Results from the ORPHEUS dark  
matter detector

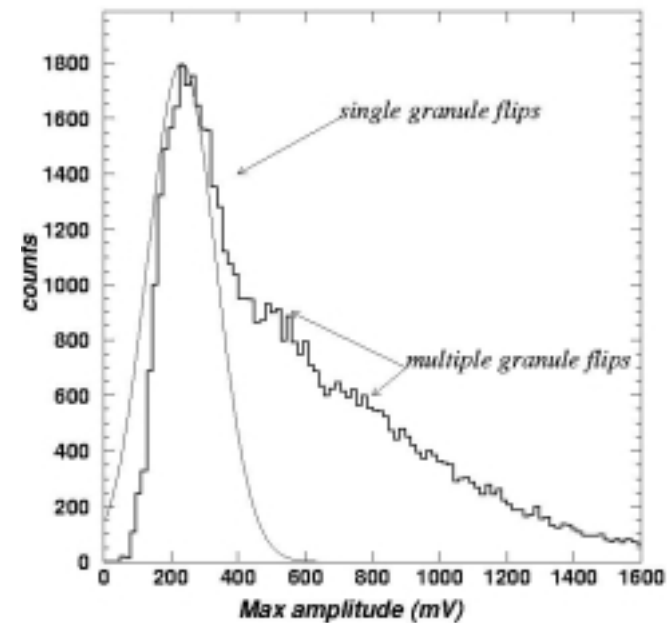
# Amplitude distributions

## Big granules



The amplitude of the pulses allows to distinguish the single granule flip.

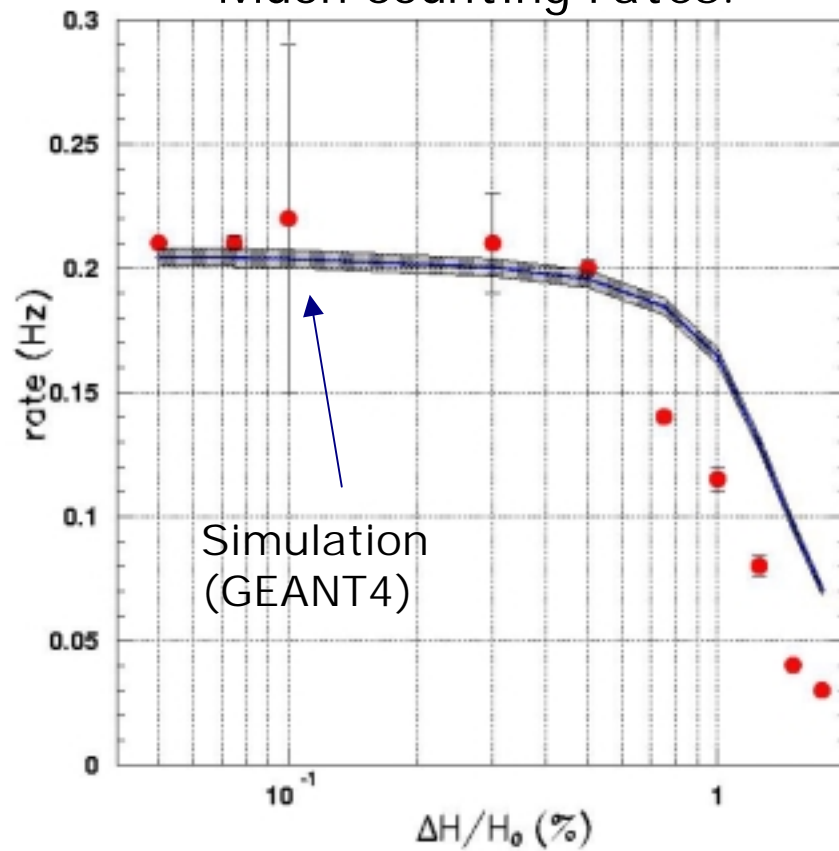
## Small granules



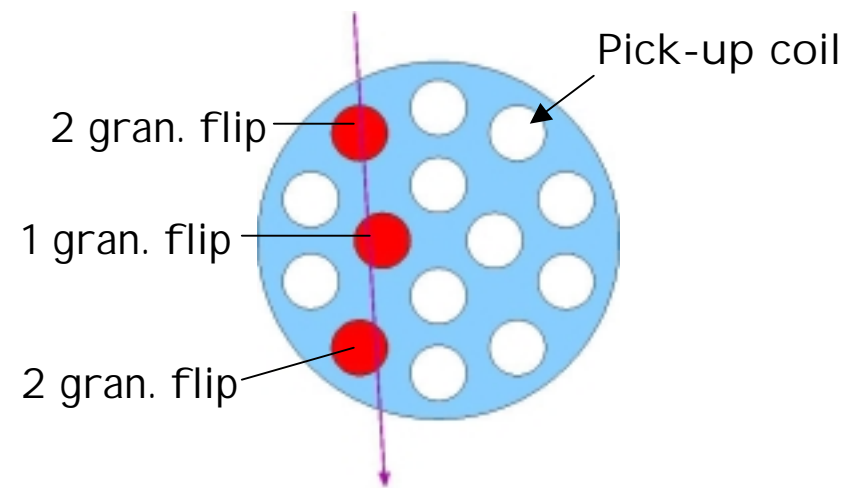
Results from the ORPHEUS dark matter detector

# Muons

Muon counting rates:



Front view of one module



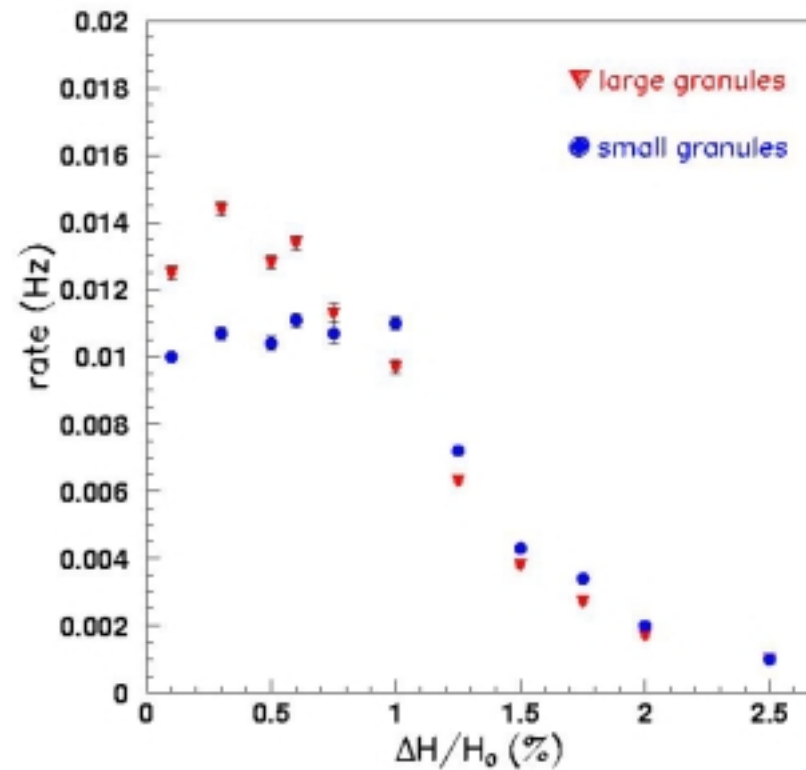
A muon event

Results from the ORPHEUS dark matter detector



# Single rates

The small granules have better discrimination power than the big granules



Results from the ORPHEUS dark matter detector



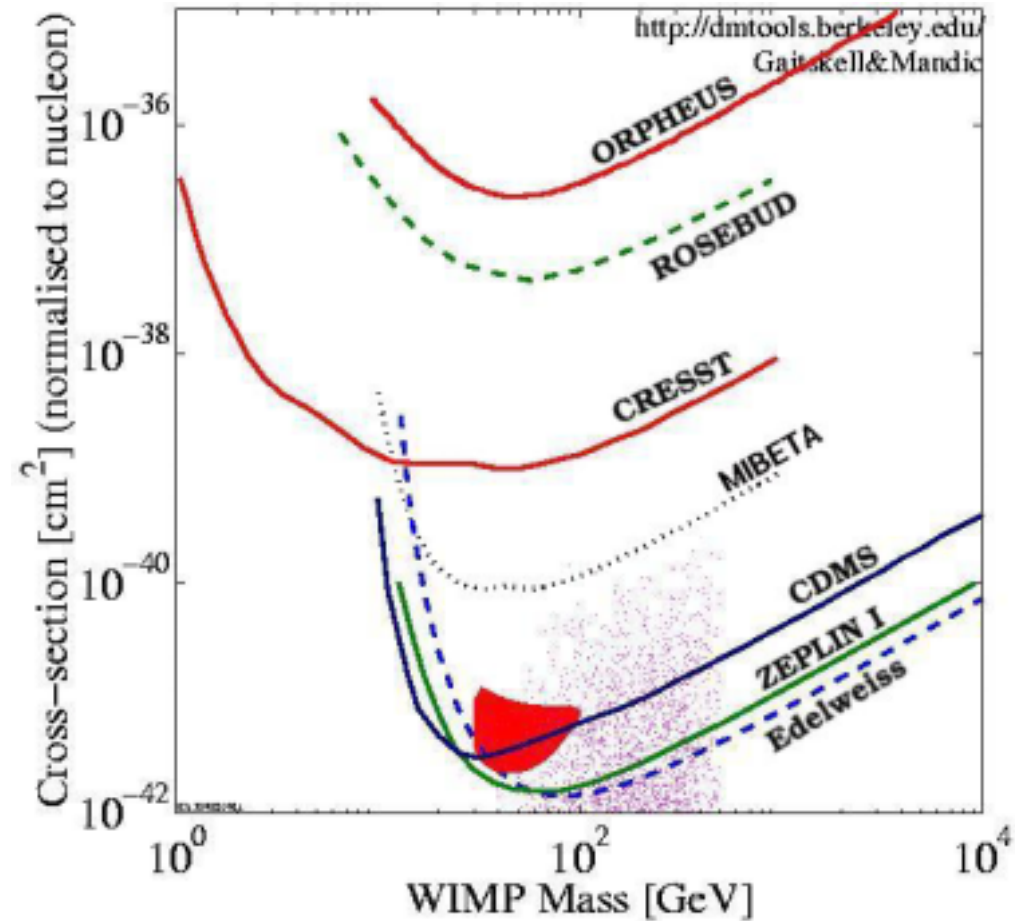
# Preliminary results

$$\rho_{\text{halo}} = 0.3 \text{ GeV cm}^{-3}$$

$$V_E = 243.5 \text{ km s}^{-1}$$

$$V_{\text{esc}} = 570 \text{ km s}^{-1}$$

$$\sigma_v = 270 \text{ km s}^{-1}$$



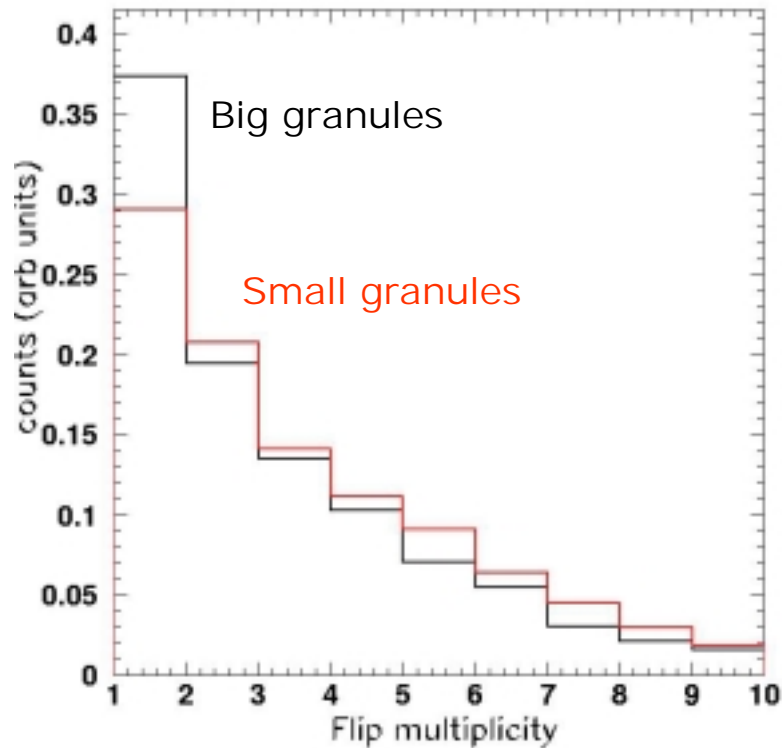
Results from the ORPHEUS dark matter detector



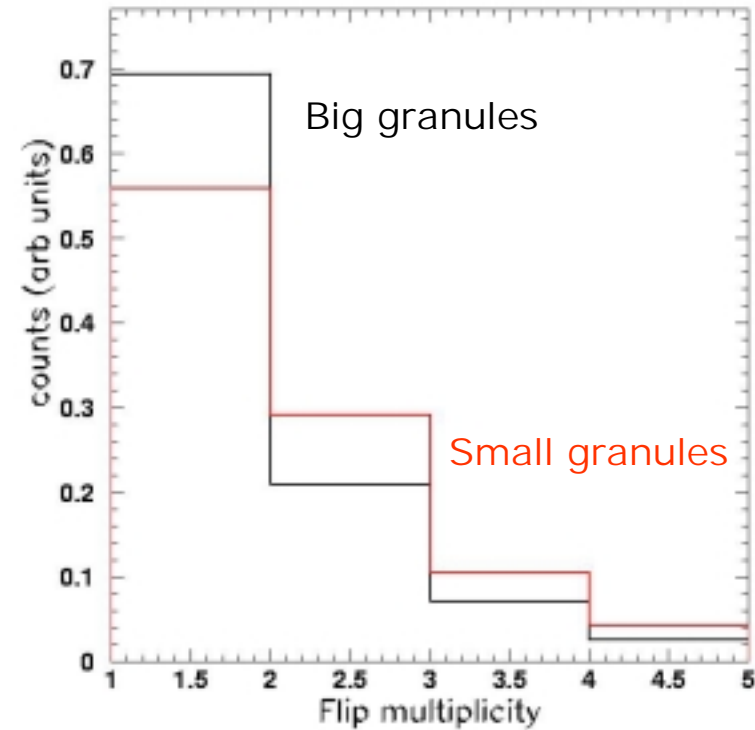
# Flip multiplicity in the detector

The small granules have more discrimination power than the big ones.

Data at  $\Delta H/H=0.075\%$



With  $^{57}\text{Co}$  source:



Results from the ORPHEUS dark matter detector