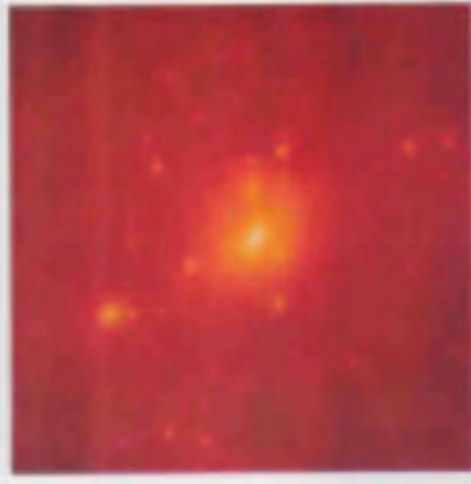


Present and future dark matter searches



Sam Henry, University of Oxford, UK.

- **Dark matter searches**
Experiments aiming to detect the supersymmetric particles believed to make up 90% of the mass of our galaxy
- **The present**
Limits set on possible parameters
- **The future**
Improved sensitivity and background discrimination
Discovery?



Conclusions

- Present experiments have set limits on possible WIMP mass and interaction cross-section
- Future experiments will search a large fraction of SUSY parameter space
- WIMPs may be discovered by these projects, or by accelerator experiments



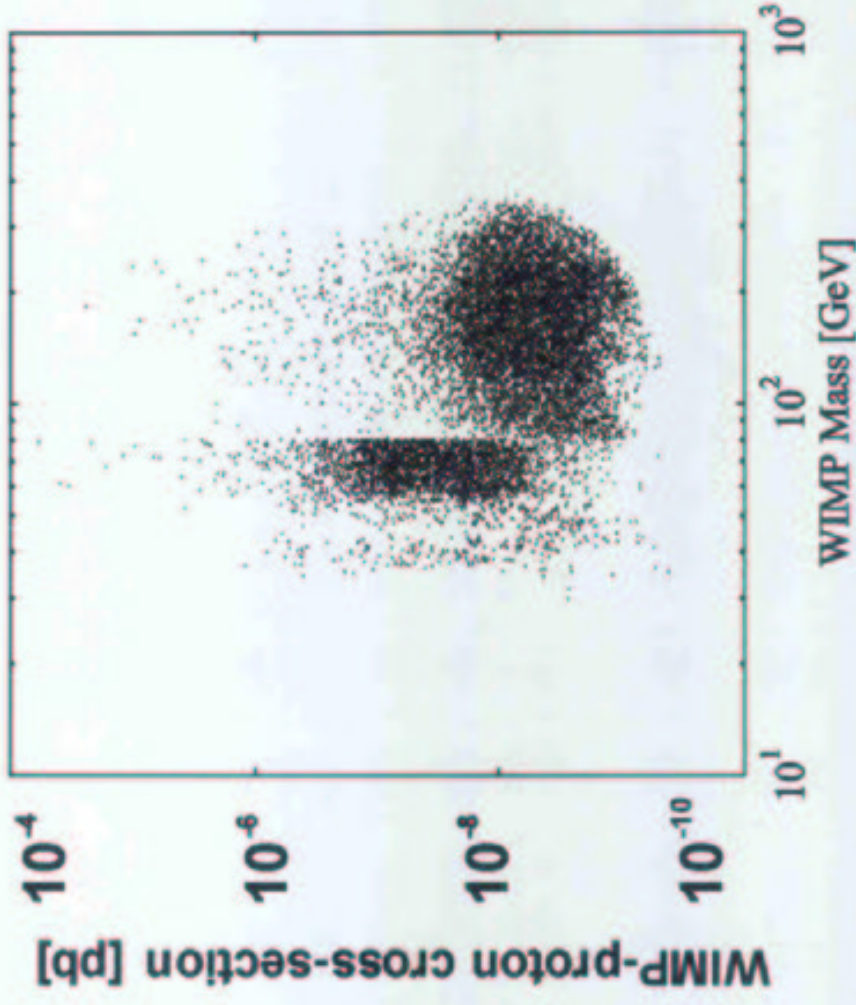
Dark matter



- Evidence for dark matter
 - Spiral galaxies
 - Clusters of galaxies
 - Density of the Universe
- Primordial Nucleosynthesis
 - 80-95% of matter is non baryonic
- Cold dark matter
 - Weakly Interacting Massive Particles

Supersymmetry

- Beyond the Standard Model of particle physics
- Fermion - Boson symmetry
- Lightest Supersymmetric Partner - Neutralino - WIMP
- MSSM models predict neutralino parameters

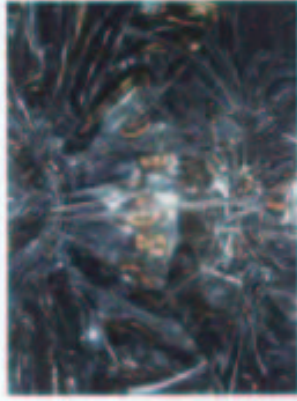


Detecting WIMPs

- Very occasionally, a WIMP will scatter off an atom causing the nucleus to recoil
- This can be detected in several ways:



- Ionization detectors
Detect the electrons excited by the events



- Scintillation detectors
Detect the photons emitted by excited electrons in a scintillator material



- Cryogenic calorimetric detectors
Detect the tiny rise in temperature due to the high phonon flux produced

WIMP search experiments



CRESST

- Gran Sasso, Italy



EDELWEISS

- Modane, France



DAMA

- Gran Sasso, Italy



UKDMC

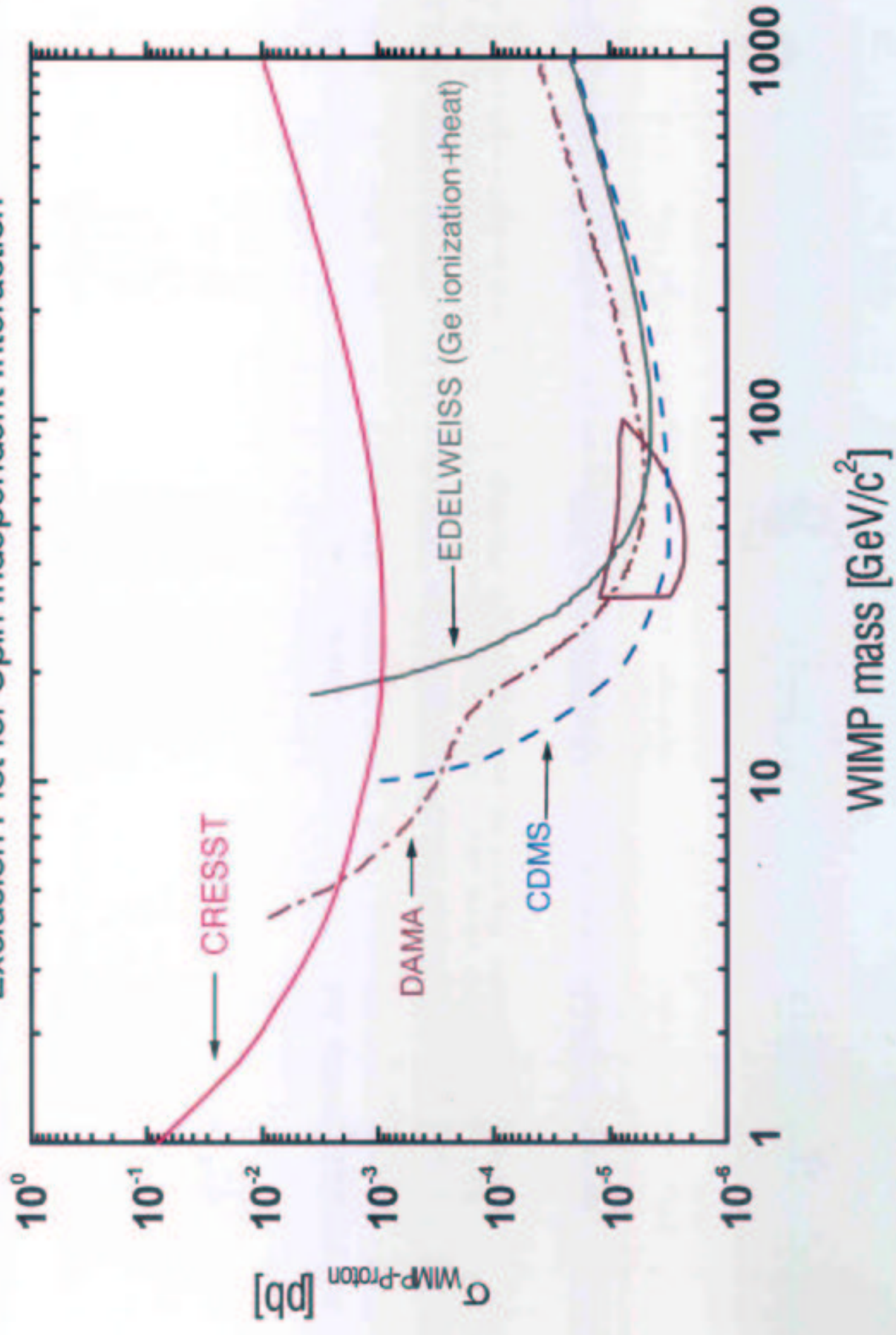
- Boulby mine, England



CDMS

- Stanford, California

Exclusion Plot for Spin Independent Interaction



Future aims

UKDMC

- ZEPLIN detectors - Ionisation and scintillation signal

DAMA

- Increase absorber to 250kg NaI

CDMS

- Move experiment to Soudan Mine, Minnesota

EDELWEISS

- EDELWEISS II - 100 detectors, 2003



Phase III?

Confirming a positive signal

- Annual modulation signal
- Different absorber materials

2005-

- Searched a large fraction of parameter space
- SUSY searches at LHC / other accelerators

Phase III dark matter search

- 100kg, 1-tonne absorber?



