NEWS-G (New Experiments with Spheres – Gas)

G Gerbier, Queen's, 2017 march 24

Sites : Laboratoire Souterrain de Modane and SNOLAB
Numbers of collaborators : around 35
Collaborating institutes 10 : Canada, France, Greece, Germany, USA, UK

Primary physics goals

WIMP range mass of 0.1 to 2 GeV, cross section ranges down to few 10^{-42} cm^2 depending on mass, and background reached
KK solar axion decay, low mass spin dependent (H)
Investigating directionality at low mass

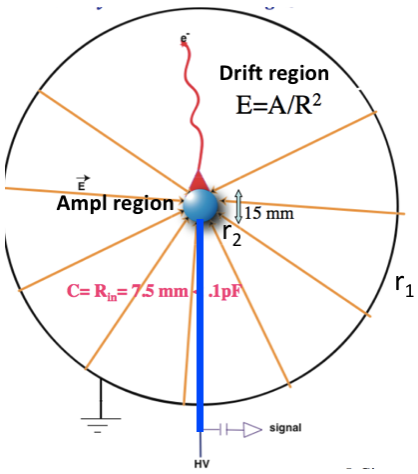
Experimental approach and setup

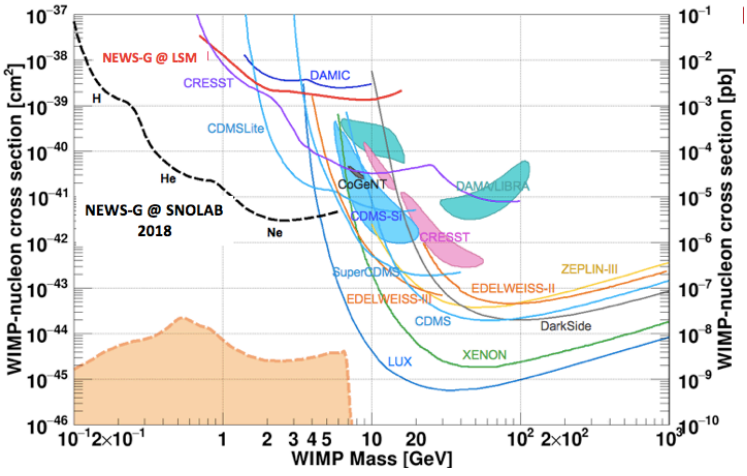
Spherical proportional counter (very low threshold down to single ionization electron, few 10th's of eV) with low A targets (He, H to match low mass WIMP).
Surface/volume discrimination
e/Nr discrimination at low pressure
Existing low activity set-up at LSM, 60 cm prototype, not optimized shield
Project of 140 cm detector to be installed at SNOLAB

Summary of existing and future physics results

First result with Ne target at LSM : sensitivity down to 0.5 GeV, 10^{-37} cm^2
Projects : sensitivity in mass down to 0.1 GeV (use of H from CH4), and 10-^{37} cm^2in X section, X section limited by radioactive background
R&D on going on sensors (multi channels)
Phase 2 upgrade with underground electroformed copper sphere (PNNL), >10 reduction in background,

Plot(s) that summarize the experimental sensitivity and/or concept





Timescale of future plans

2017 mid : publication of first paper with Ne target
2017 end : first results with He in 60 cm prototype at LSM
2018 mid : installation of 140 cm detector at SNOLAB
2018 end : first runs

Rough estimate of budget

2.5 M$ US, capital cost, secured for first phase (Canada), not for phase 2 (see above)