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Conférences d'hiver 2011

Moriond EW, La Thuile
(Neutrino Telescopes, Venice)

Astroparticules

Neutrinos

Matière noire

Astroparticules: Rayons cosmiques

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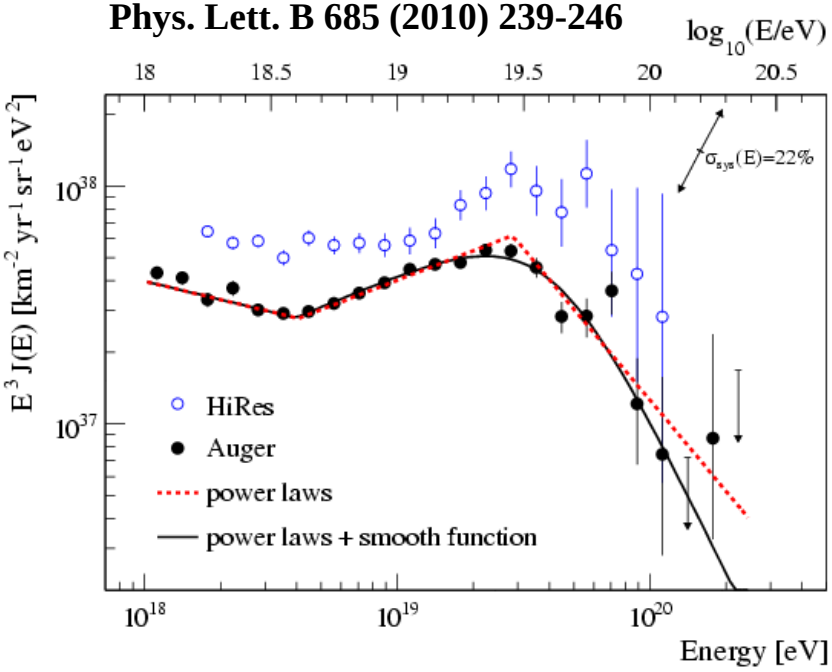
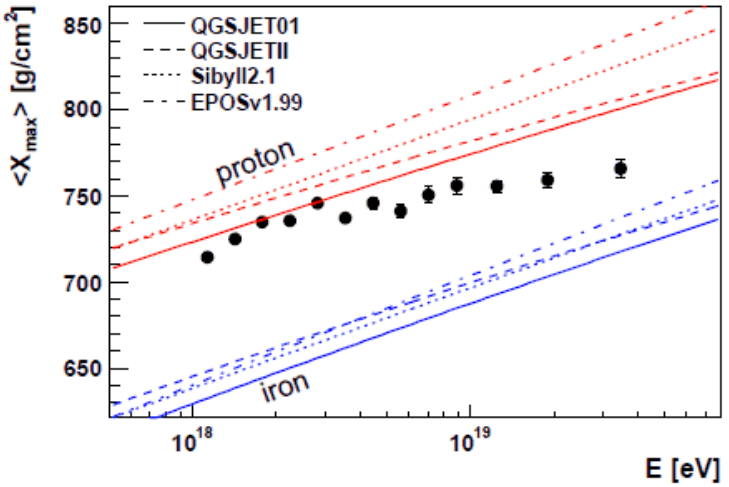
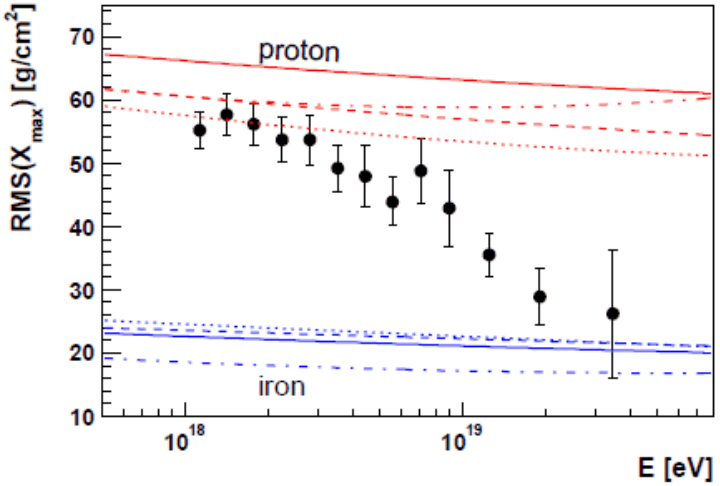
Phys. Lett. B 685 (2010) 239-246



Phys. Rev. Lett 104 (2010) 091101





Astroparticules: Rayons cosmiques

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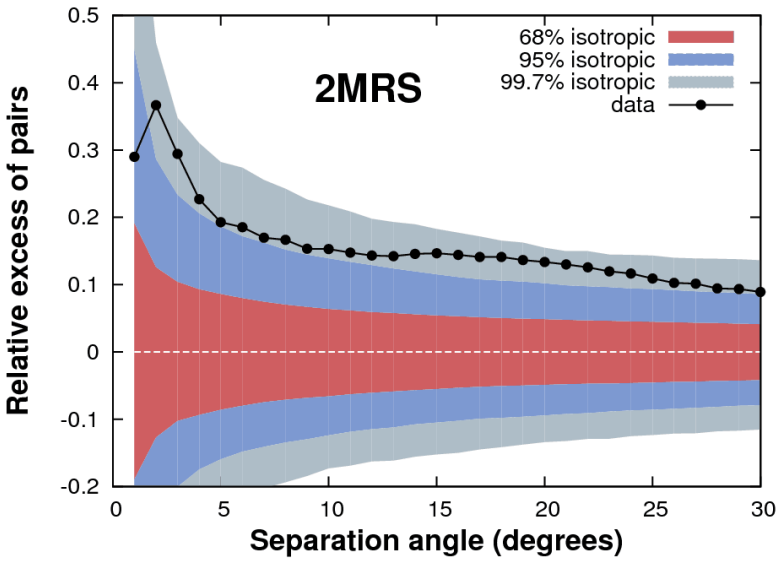
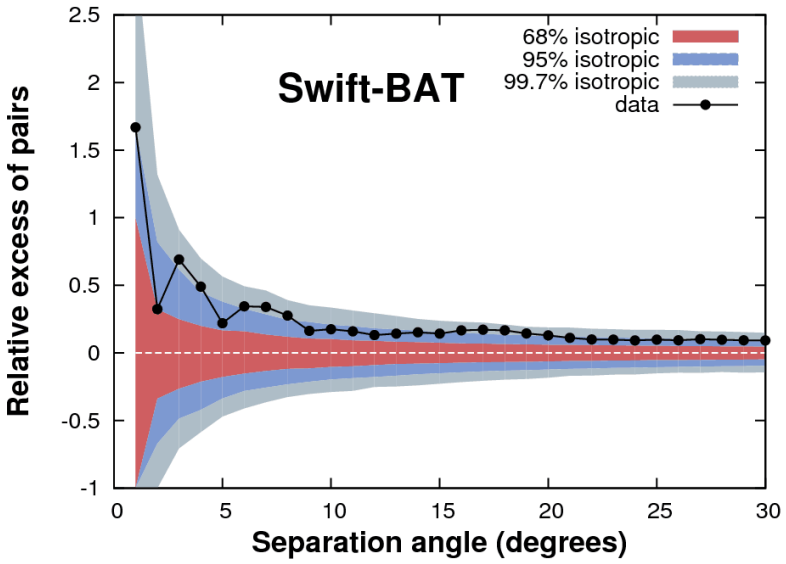
22,000 “normal” galaxies within 200Mpc



373 x-ray galaxies within 200Mpc

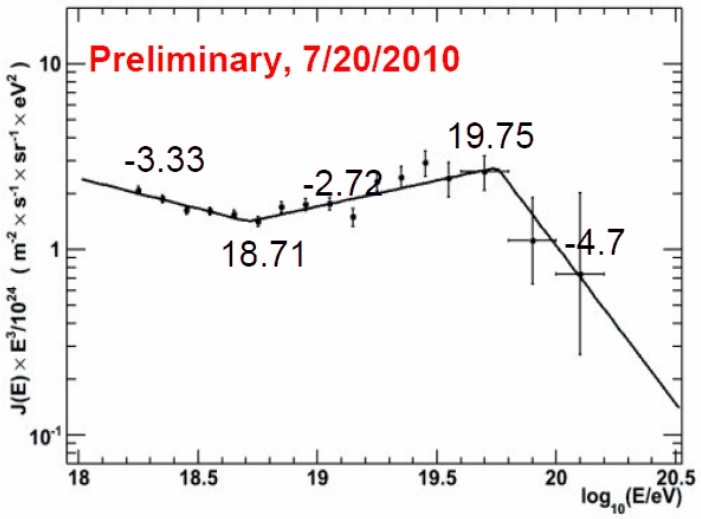


Astropart. Phys. 34 (2010) 314-326

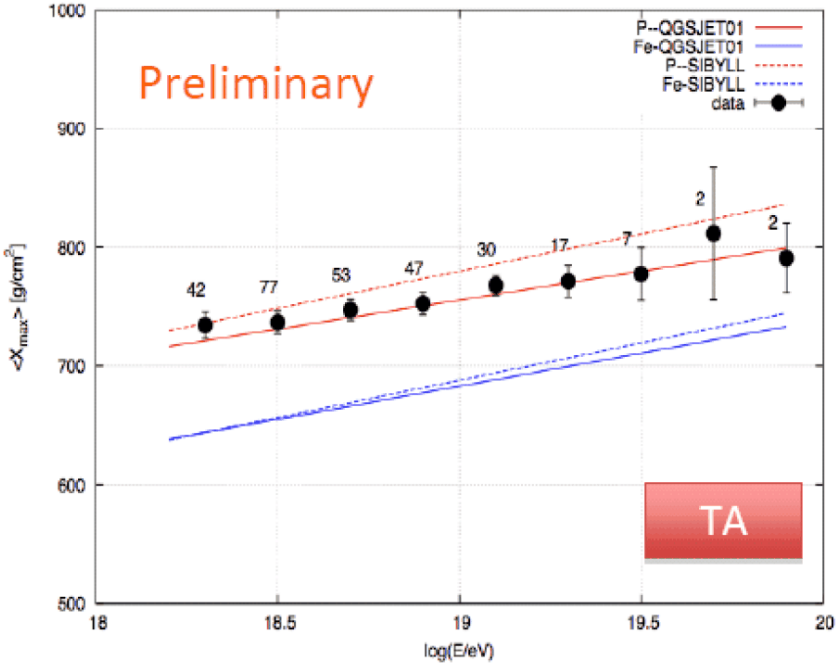
⟶ Correlation between matter distribution and UHECR

Astroparticules: Rayons cosmiques

Telescope Array



507 x 3m^2 scintillators (AGASA)
3 fluorescence telescope stations (HiRes)



remarque personnelle:

surface TA ~ 1/4 Auger
exposure TA ~ 1/10 Auger

évènements TA ~ 1/2 Auger

Neutrino telescopes: IceCube + ANTARES

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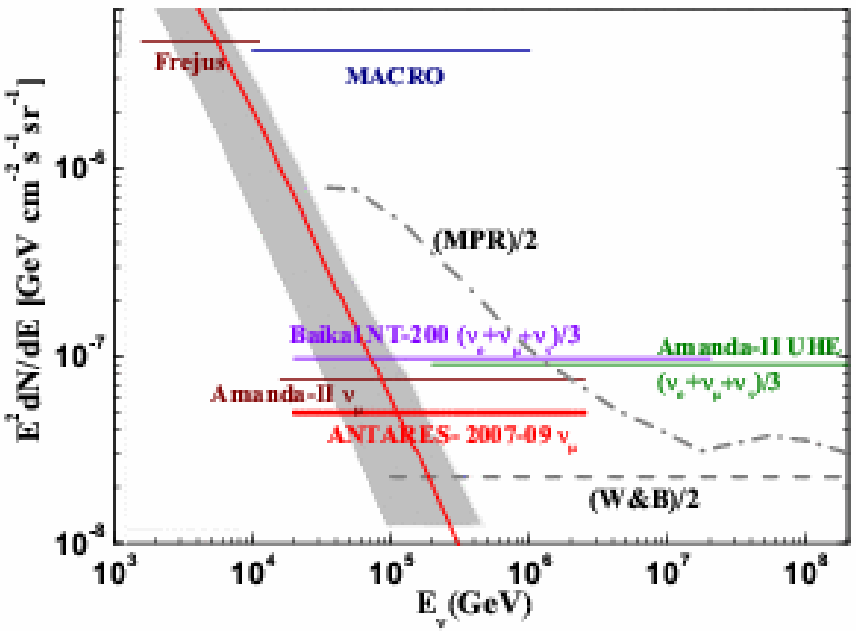
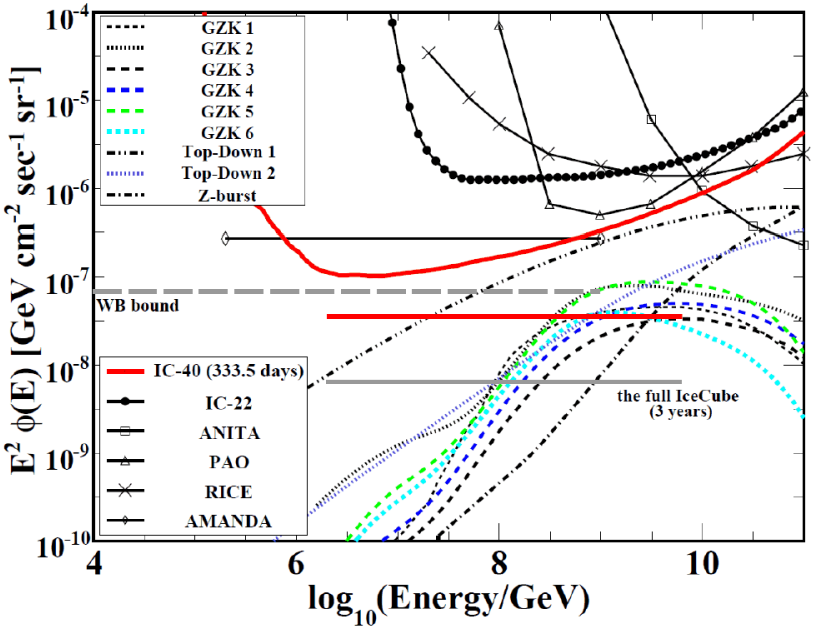
ANTARES: diffuse flux (TeV)



Phys. Letter B 696, 16-22, 2011

IceCube: diffuse flux (PeV)



remarque personnelle:
tous les modèles 'GZK' assument des protons (Auger)

Neutrino telescopes: ANTARES

Recherche de sources ponctuelles

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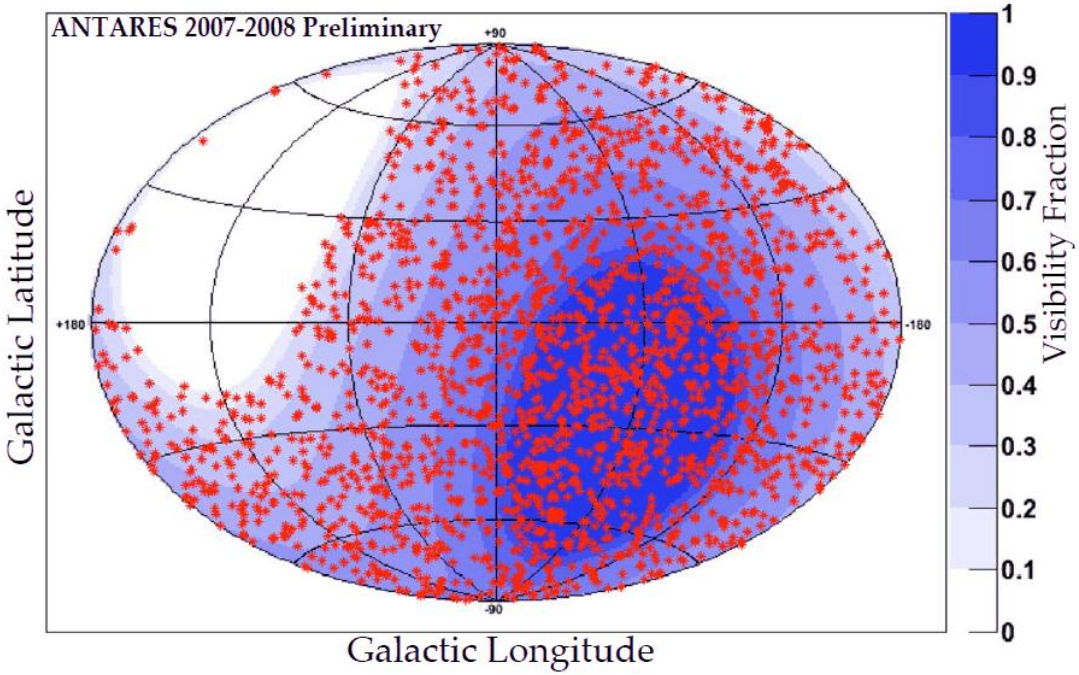
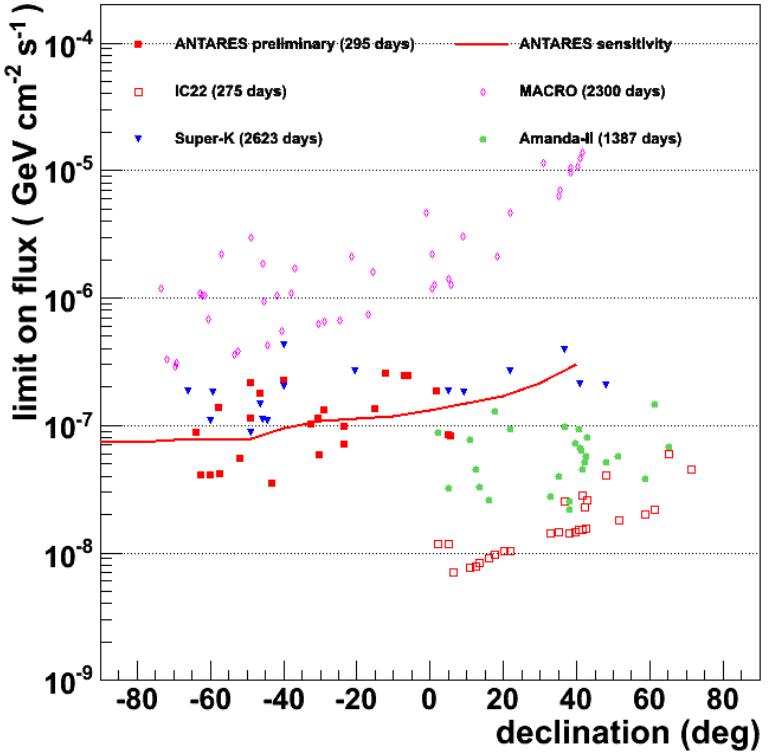
>2000 candidates
angular resolution ~0.5deg





- all sky search
- candidate source list
- autocorrelation

no significant excess found

Neutrinos: MiniBooNE (ν_e appearence)

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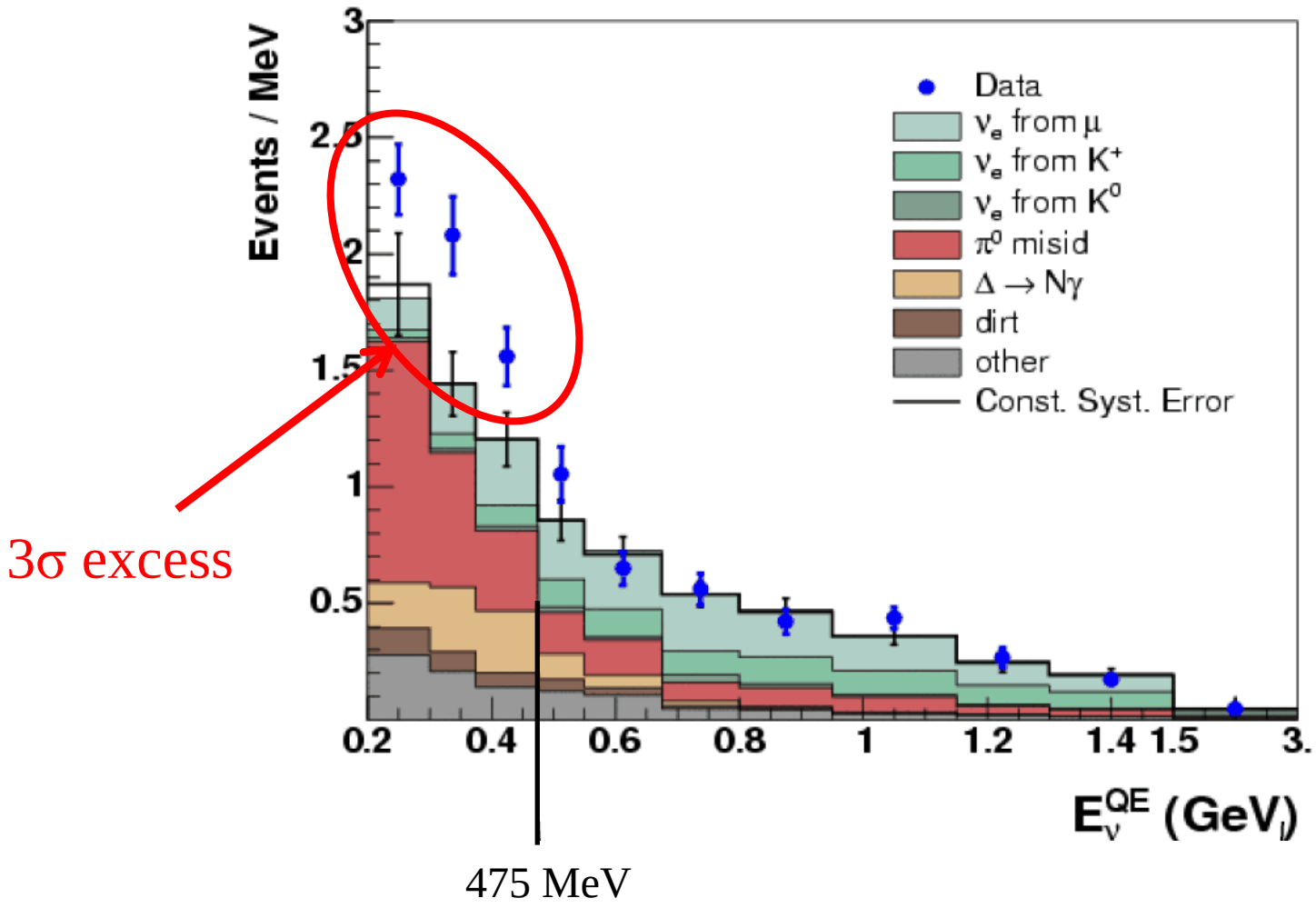
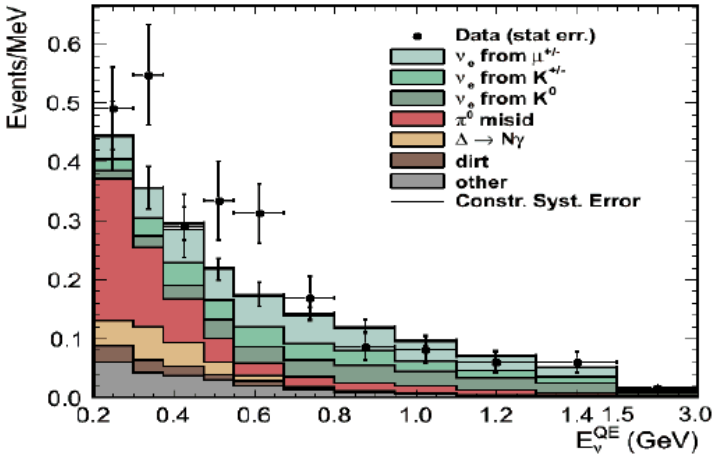


Phys. Rev. Lett. 102, 101802 (2009)

Neutrinos: MiniBooNE ($\bar{\nu}_e$ appearence)



	200-475MeV	475-1250MeV
Data	119	120
MC	100.5 ± 14.3	99.1 ± 14.0
Excess	18.5 ± 14.3	20.9 ± 14.0
LSND Best Fit	7.6	22
Expectation from ν Low E excess	11.6	0
LSND+Low E	19.2	22

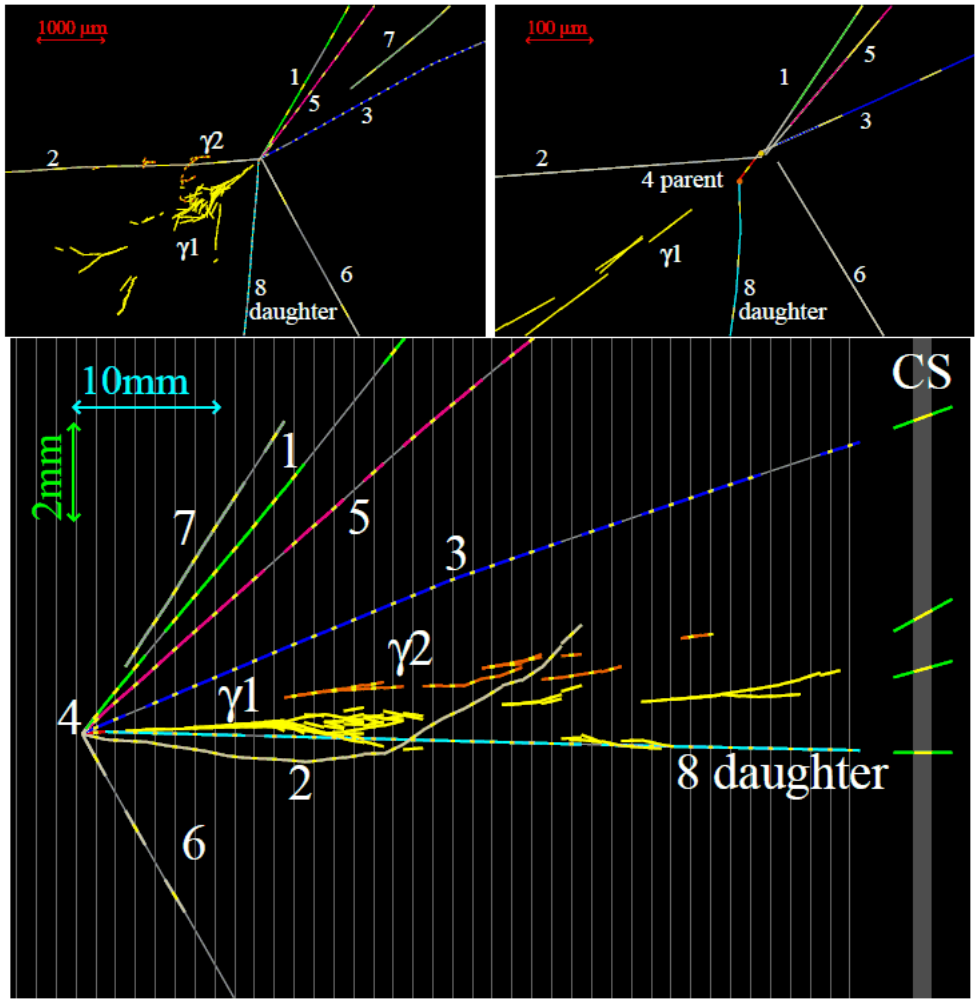
- 5.66E20 POT
- Excess of events in both 200-475MeV and 475-1250MeV region

MiniBooNE $\bar{\nu}_e$ data prefers LSND signal over null hypothesis at 99.4%

Phys. Rev. Lett. 105, 181801 (2010)

Neutrinos: OPERA

ν_τ appearance in ν_μ beam (CNGS): 1 candidate (08/2010)



Significance ~2σ

Phys. Lett. B 691 (2010) 138-145

Neutrinos: T2K

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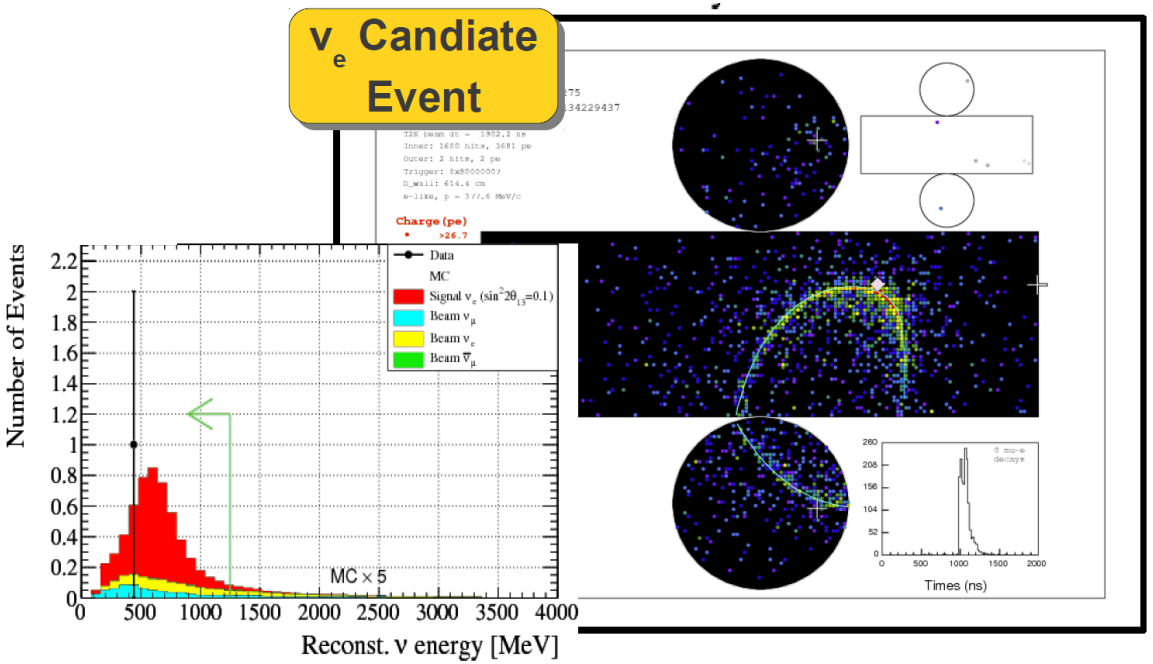
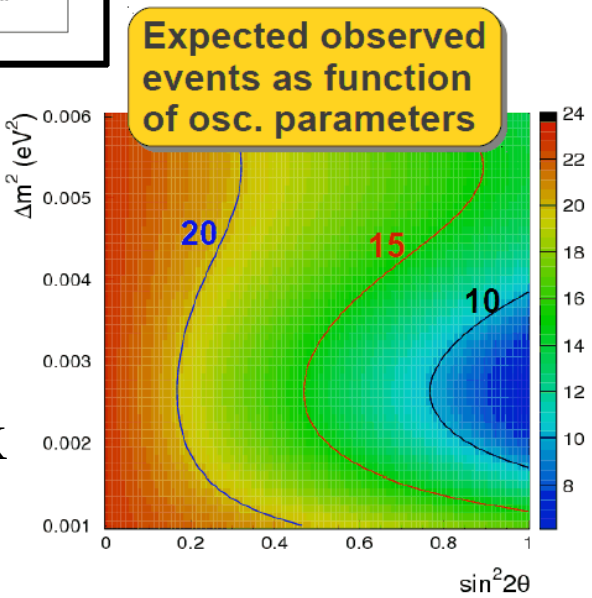


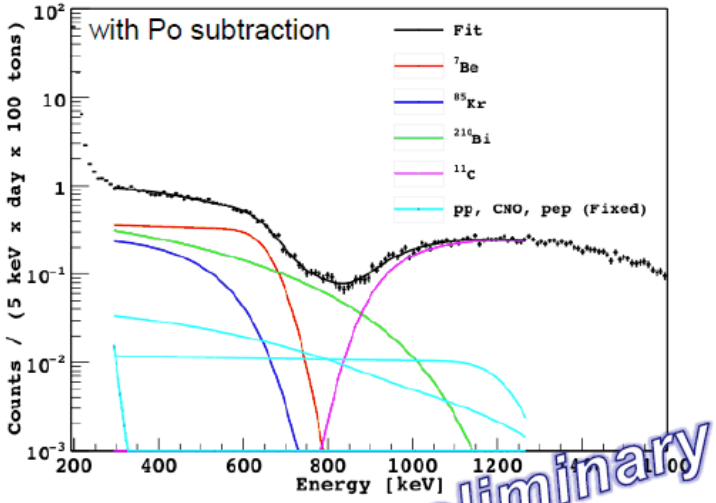
ν_e appearance in ν_μ beam
1 candidate
background 0.3 events
$\sin(\theta_{13}) < 0.5$ @ 90% C.L.

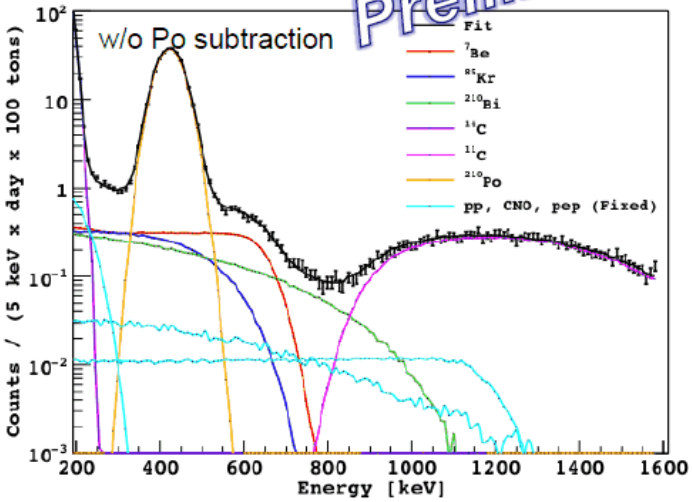


ν_μ disappearance
8 candidates in SK
agrees with Minos

See also Séminaire SPP
Marco Zito 21/03/2011

Neutrinos: Borexino





^{7}Be rate (E=862 keV line)
in 750 days of data
46.0 ± 1.5 (stat) ± 1.3 (sys)
counts/(day x 100t)
(total uncertainty is 4.3%)

Hypothesis	Expected rate
No oscillation +High Metallicity	74±4
No oscillation + Low Metallicity	67±4
Oscillation MSW + High Metallicity	48±4
Oscillation MSW + Low Metallicity	44±4

Neutrinos: Reactor Anomaly

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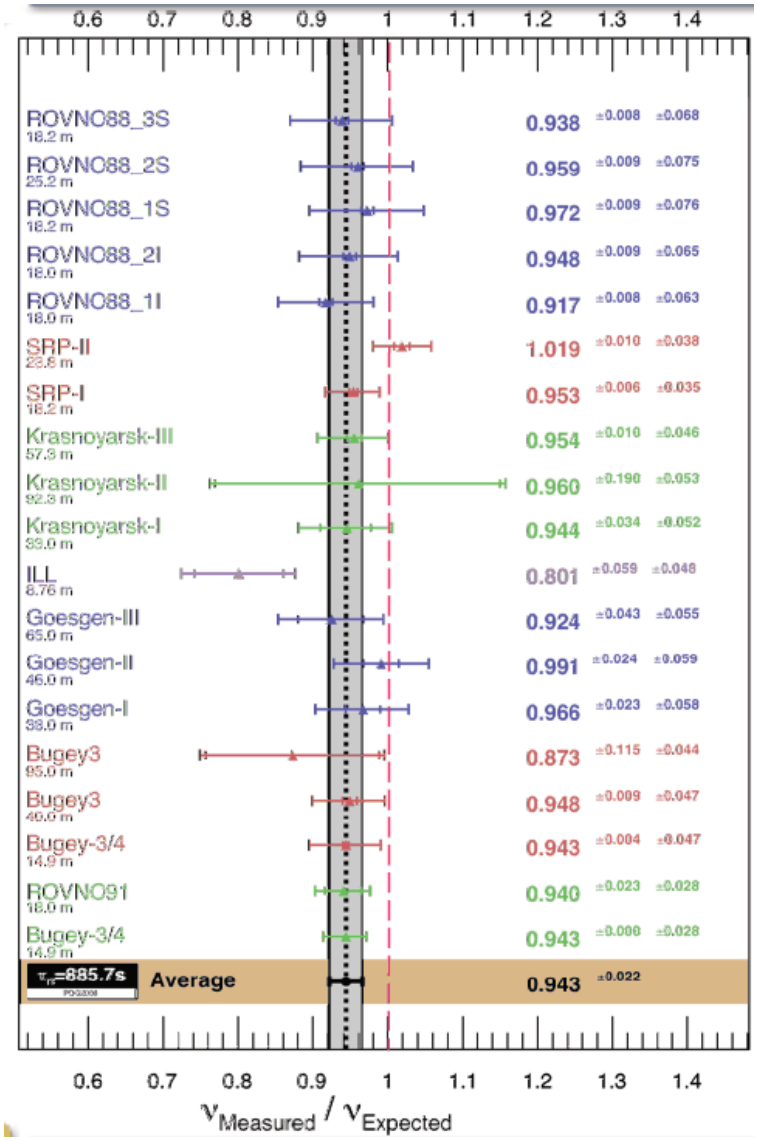
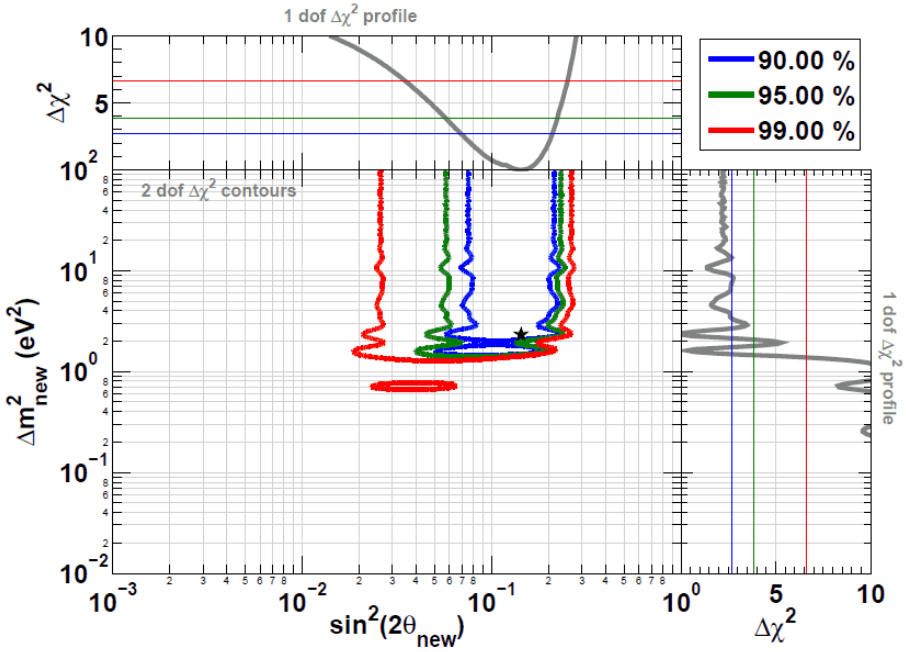




Absence of oscillations disfavoured at 99.8% C.L.

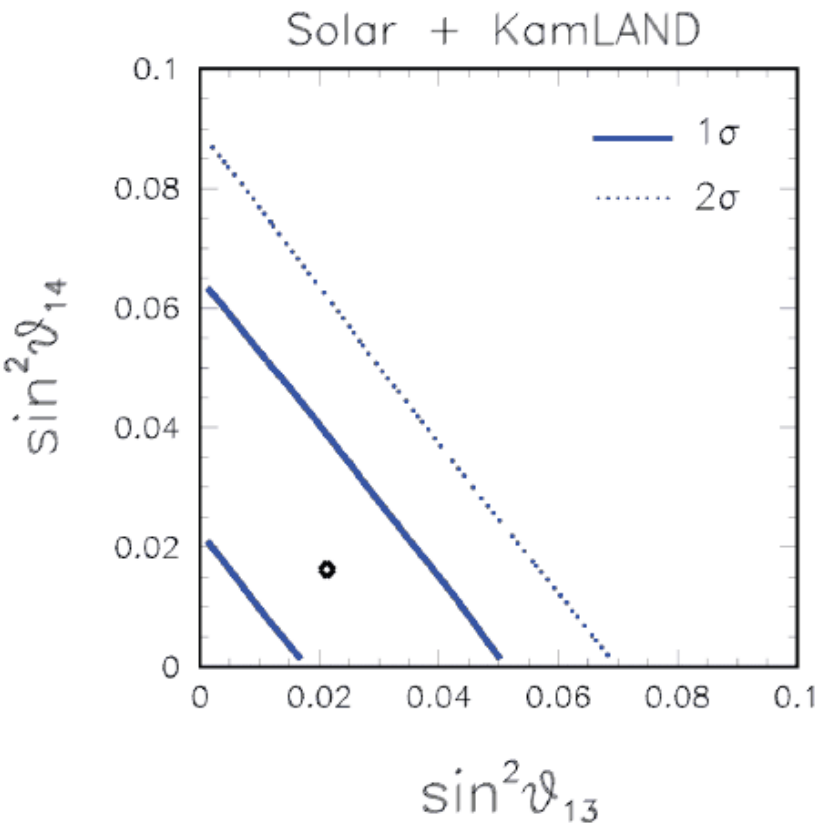
possible confirmation / infirmation

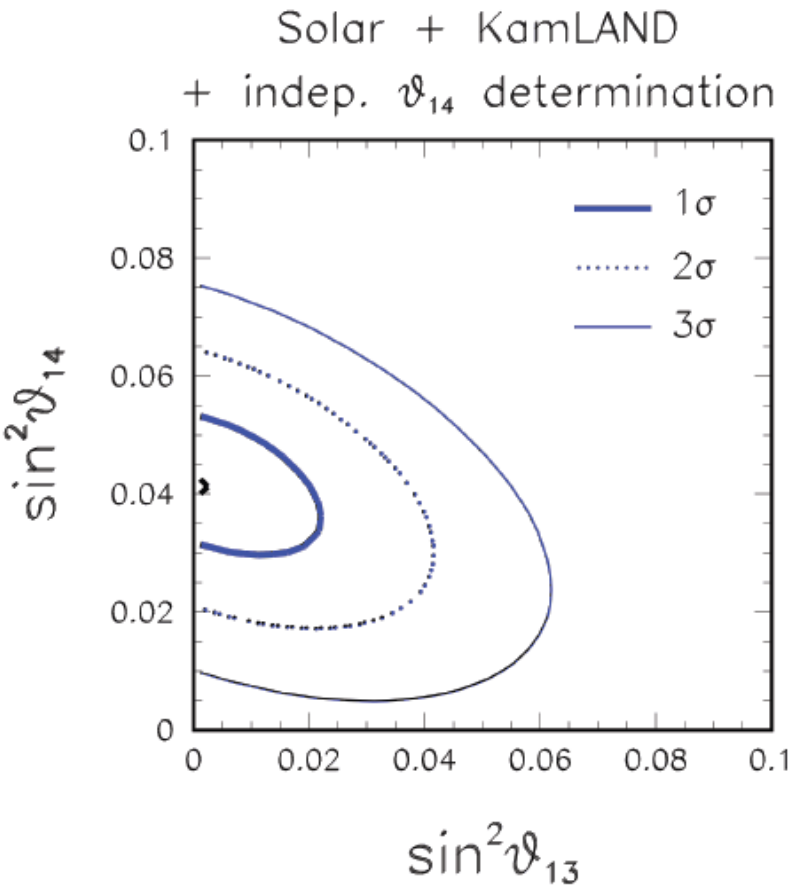
- Nucifer@Osiris
- MCi @ SNO+, Borexino, KamLAND

Neutrinos: Reactor Anomaly

A. Palazzo: influence on solar oscillations

- degeneracy between θ_{13} and θ_{14}





Lasserre@NeuTel: $\sin^2(2\theta_{13})<0.11$ (90%C.L., 1dof)

Neutrinos: other experiments

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DoubleChooz
Installation of far detector finished
Physics data taking eminent

RENO (South Korea) + Daya Bay (China)
Installation progressing
data taking forseen mid 2011

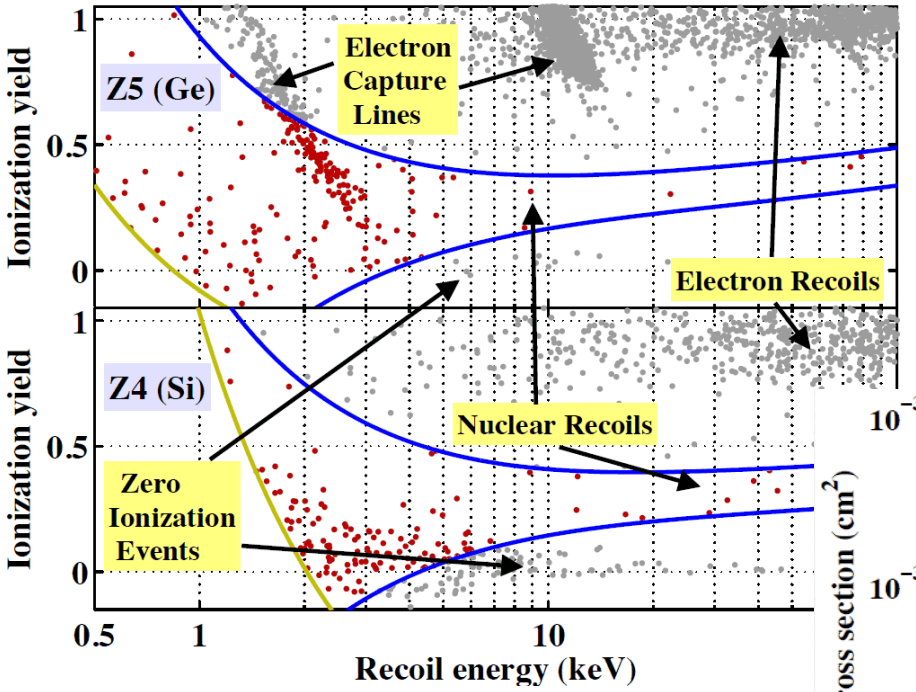
MINERνA
low E ν-nucleous cross-section measurement in NuMI beam
Test-beam and construction data analysed

ArgoNeuT
Liquid Argon TPC in NuMi beam close to Minos near detector
Cross-section measurements + R&D for LBNE detector

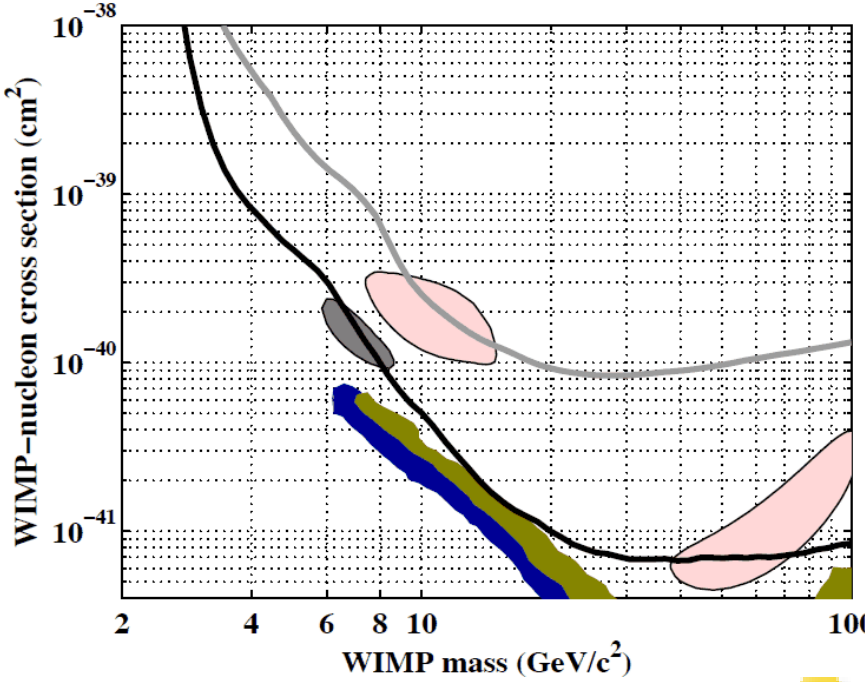
NA61/Shine
Hadron production cross-sections for T2K (+ cosmic rays)
pion production in p+C @ 31GeV

Matière noire: CDMS

low E analysis (Stanford, 17 mwe, PRD 82, 122004 (2010))



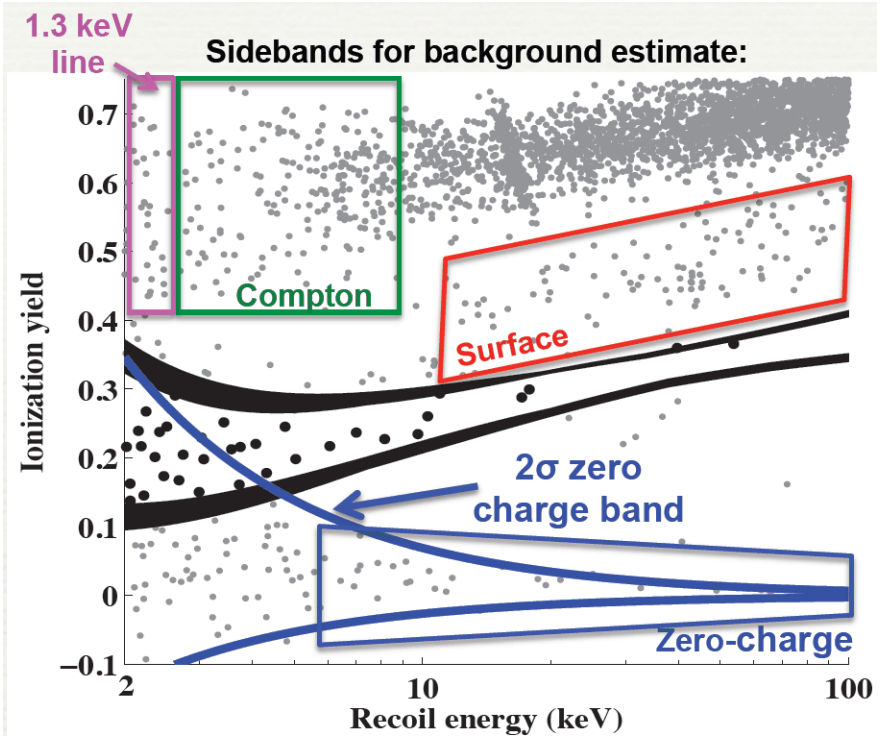
118 live days from Dec 2001 - June 2002
~3 × 224g Ge
2 × 105g Si



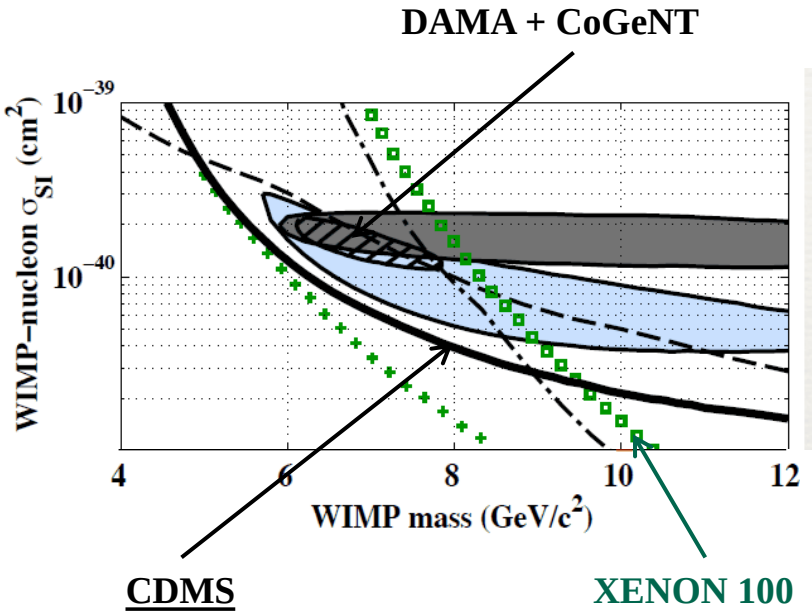
- threshold below 10keV (Dama, CoGeNT)
- no pulse shape analysis to discard backgrounds
- treating all event inside recoil band as signal

Matière noire: CDMS

low E analysis (Soudan, arXiv:1011.2482)



241 kg days (2006-2008)
8 × 230g Ge



- threshold below 10keV (Dama, CoGeNT)
- no pulse shape analysis to discard backgrounds
- treating all event inside recoil band as signal

Matière noire: Edelweiss

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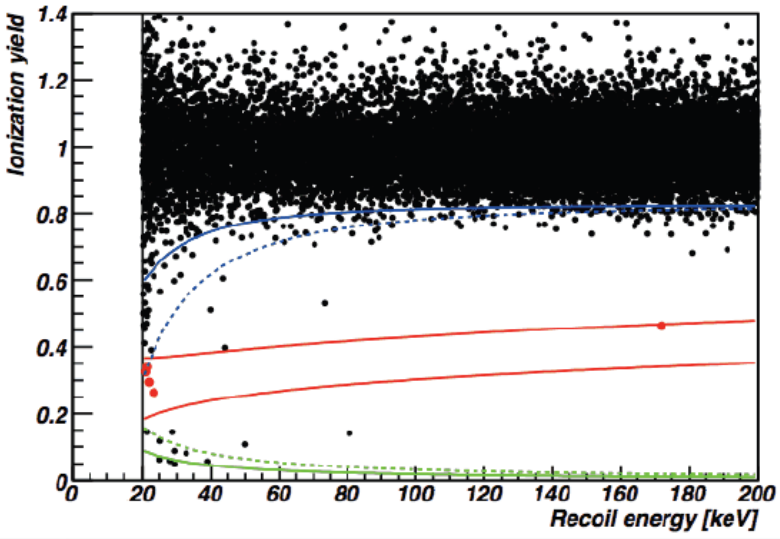
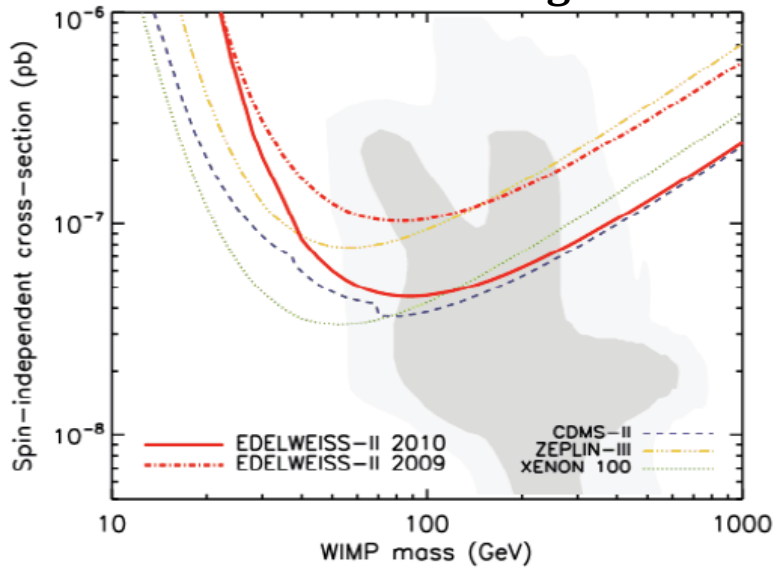


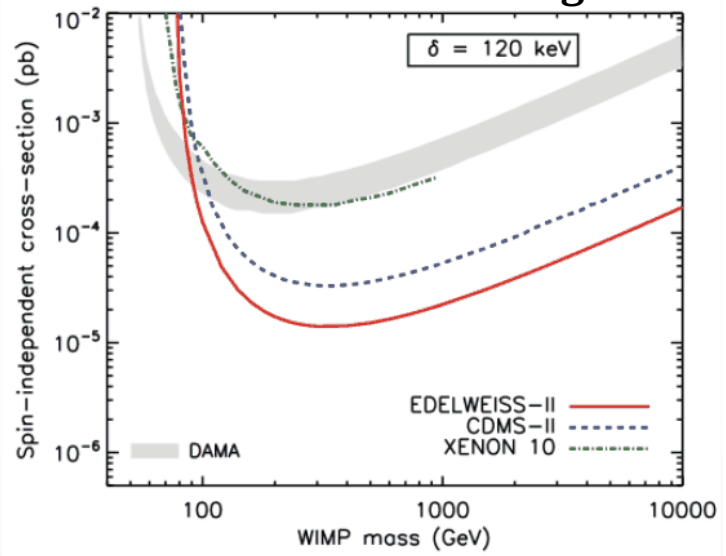
- 07-11 2008: 2x200 g Ge ID-detectors
- 04/2009 – 05/2010: 10x400 g Ge ID-detectors
- Total effective exposure: **384 kg.d**
- Analysis threshold at 20 keV

5 candidates (background < 2.9)

elastic scattering



inelastic scattering



Matière noire: autres experiences

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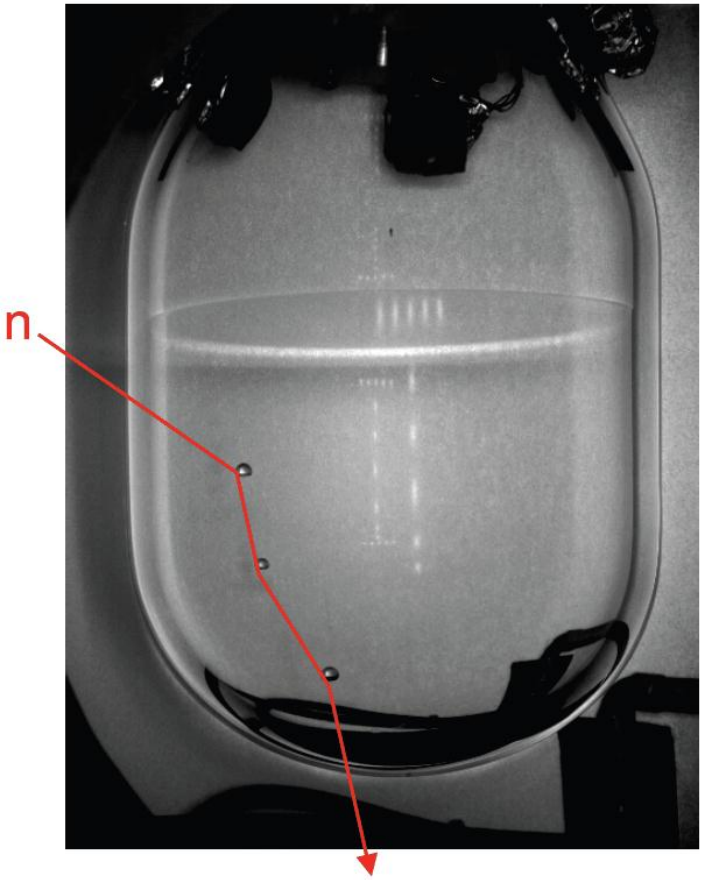
Nobel liquids: Xenon100 results delayed (?)

COUPP

- bubble chamber with optical and acoustic identification
- optical trigger with online image analysis at 100fps



Matière noire: autres techniques

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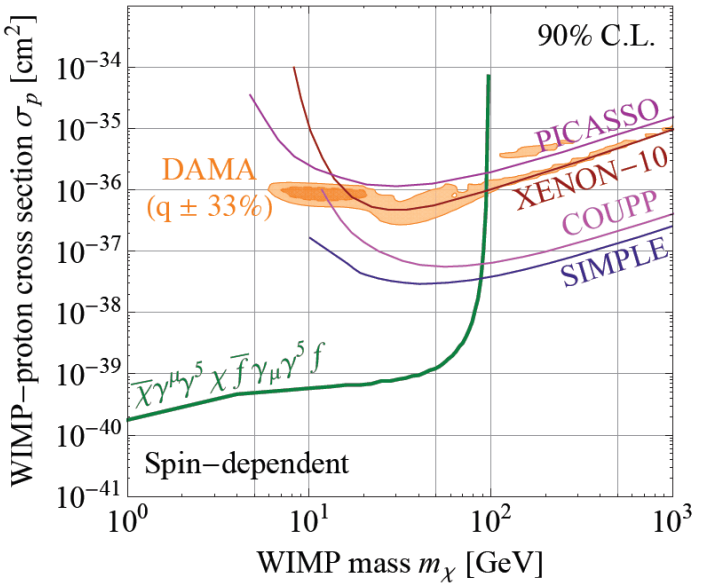
DM-limits from **LEP**:
mono-photons + missing energy

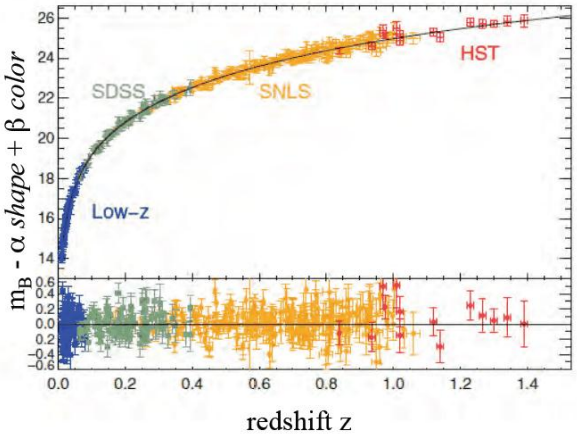
Equal couplings to all SM fermions

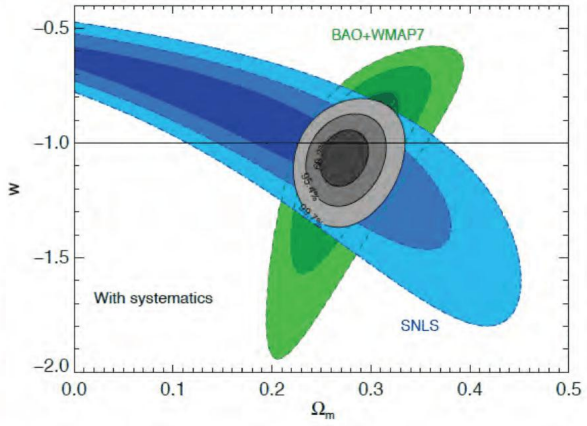


Fox Harnik JK Bai, arXiv:1103.0240

Fermi-LAT: diffuse gamma ray flux yields limit on low E dark matter annihilations

Super**N**ova **L**egacy **S**urvey





Neutrinoless double beta decay: GERDA

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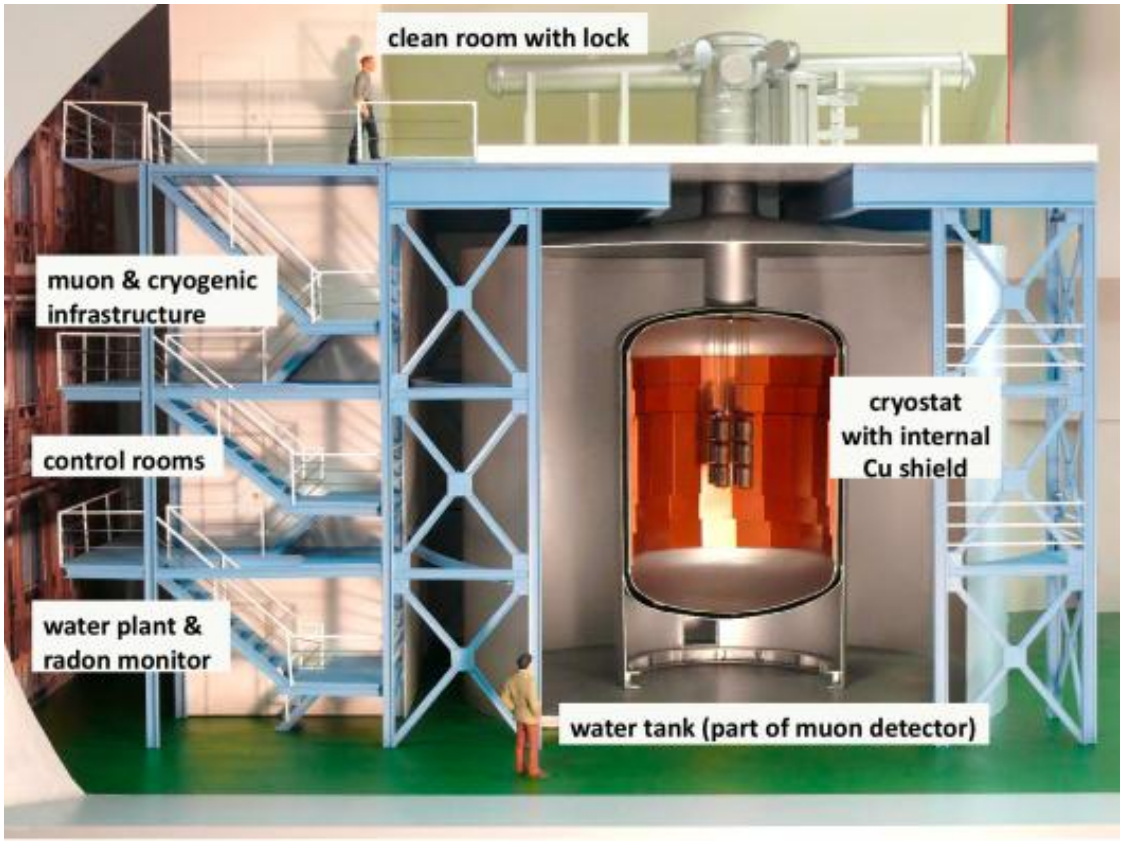
installation of phase-I finished (18kg Ge)
increased background due to electric fields
rate ~0.055 cts/(keV kg y) vs. 0.01 expected



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