

An aerial photograph of Ringberg Castle, a large, light-colored stone building with multiple towers and a central courtyard, situated on a hillside. The castle is surrounded by lush green trees and fields. In the background, a large blue lake stretches across the valley, with a town and more hills visible in the distance under a clear sky.

Light 07

Masahiro Teshima

Max-Planck-Institute for Physics
@ Light07, Ringberg



Oktoberfest



Mr. Ude opens the first beer Barrel



Muenchener Kindl 2007
(Oktoberfest Queen)



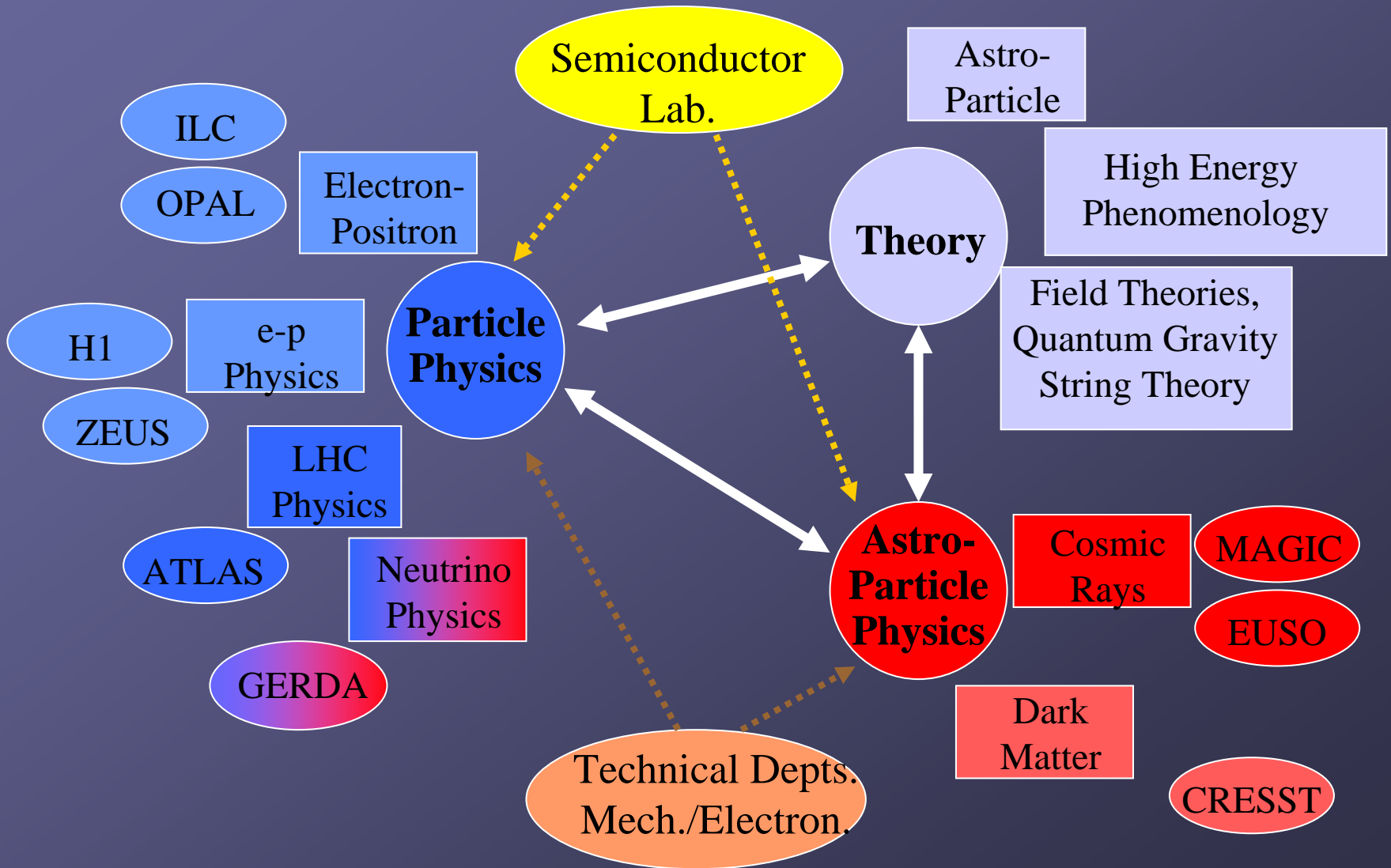
Mr. Ude and Mr. Stoiber



**Max-Planck-Institute for Physics, Munich
(Werner Heisenberg Institute since 1958)**

Max-Planck-Institute for Physics

Research fields and Projects

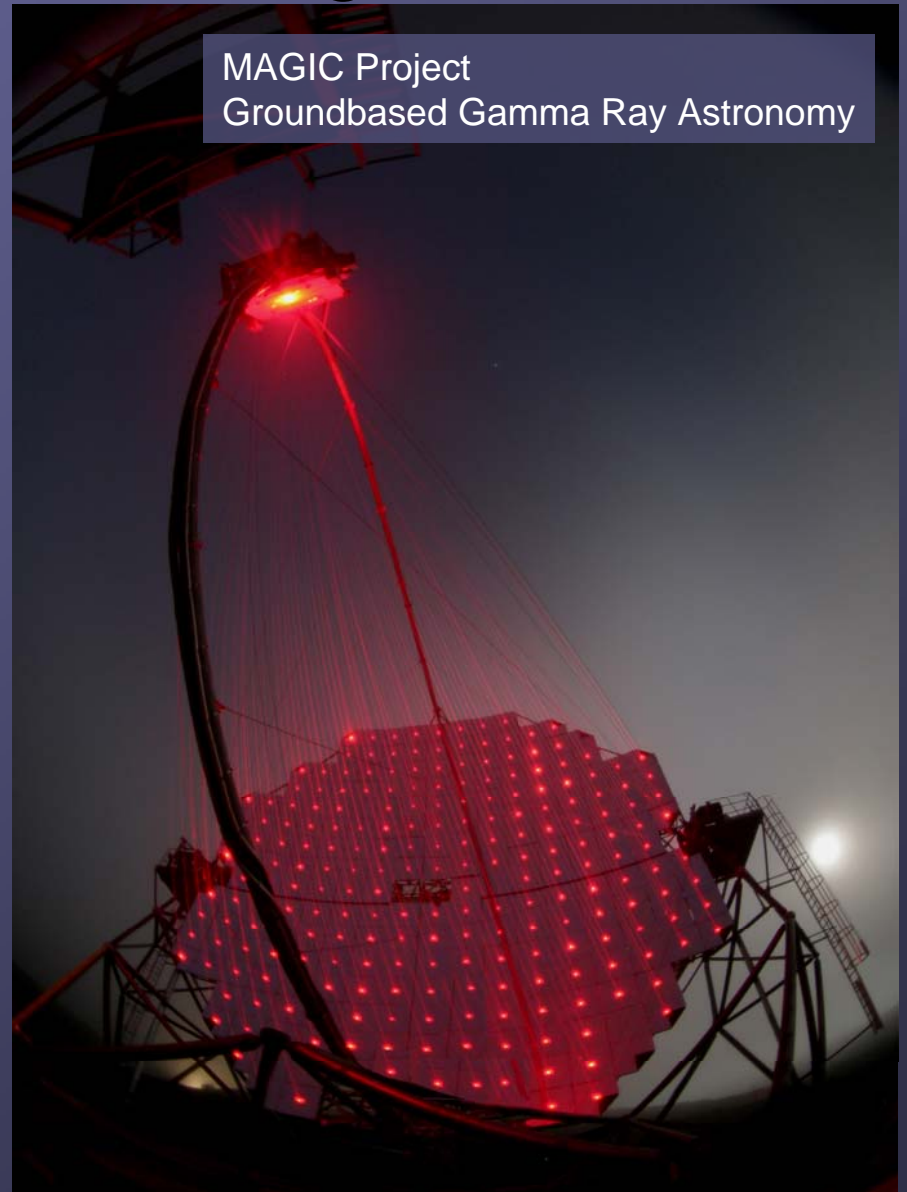


Department of exp. AstroParticle Physics

JEM-EUSO (JAXA, Phase A/B)
UHECR-Space experiment



MAGIC Project
Groundbased Gamma Ray Astronomy

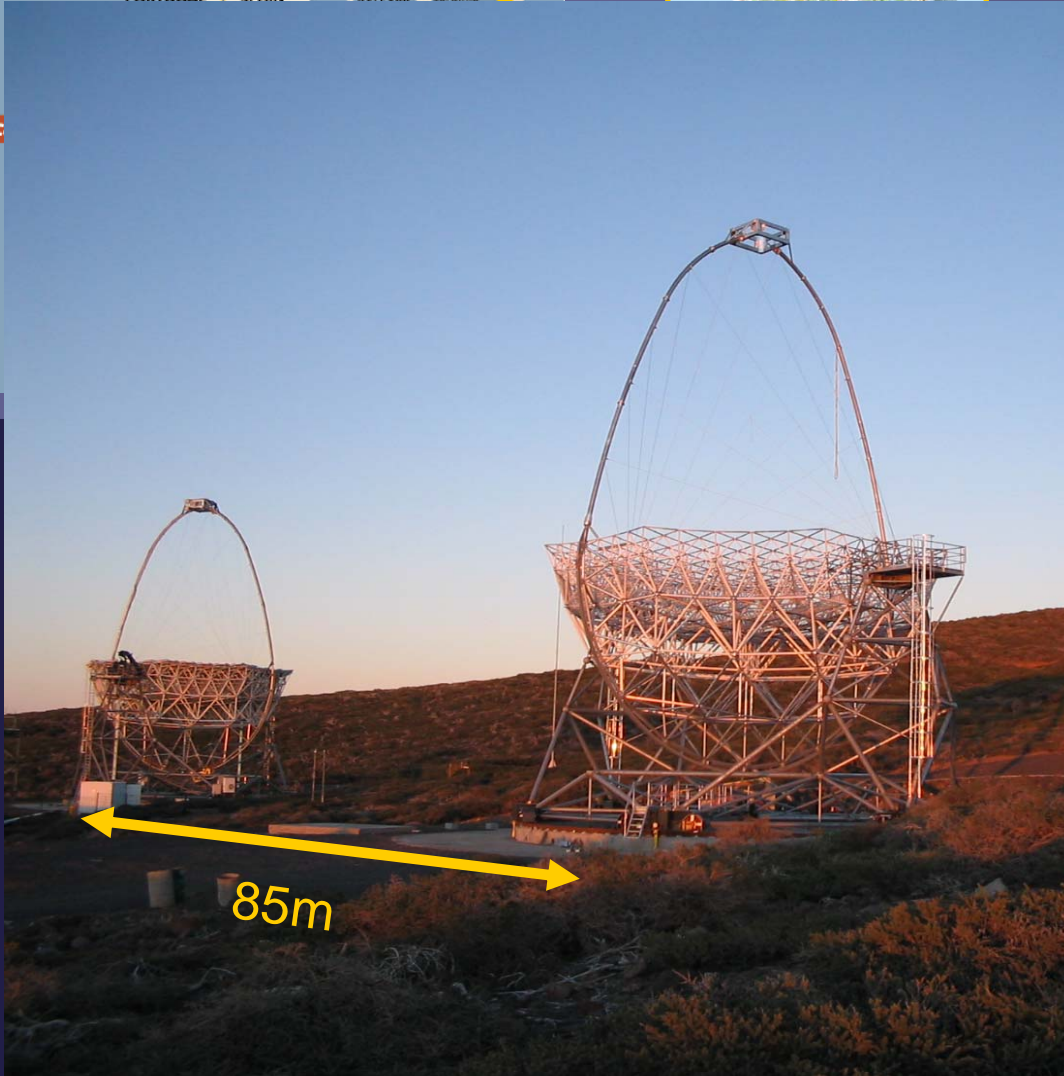


CRESST Underground
Dark Matter Search



MAGIC Project

High Energy Gamma Ray Astronomy



New technologies to lower the threshold energy

17m diameter world largest cherenkov tel.
0.1° High resolution camera
Analogue signal fiber transmission

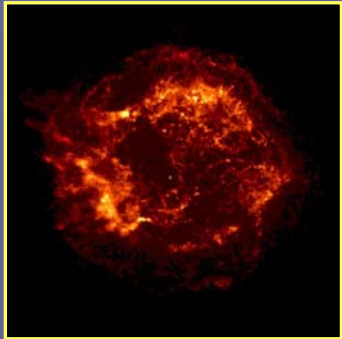
Current MAGIC-I Performance

Fast rotation for GRB < 40secs
Trigger threshold ~50GeV
Sensitivity ~2% of Crab (50hrs)
Angular resolution ~0.1 degrees
Energy Resolution 20-30%

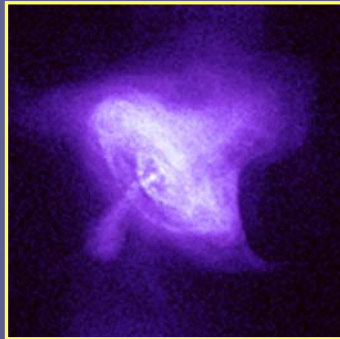
MAGIC-II is under construction and will be completed in the fall of the next year

Improve sensitivity by a factor of three
Effectively lower the threshold energy

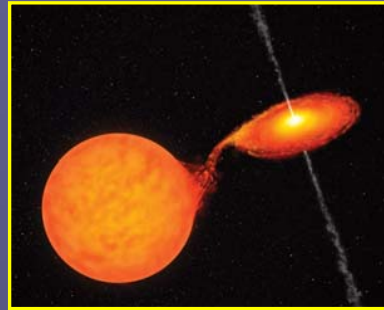
Scientific Objectives



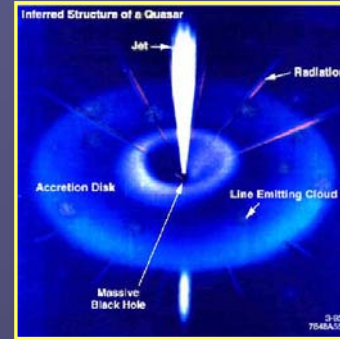
SNRs



Pulsars
and PWN



Micro quasars
X-ray binaries



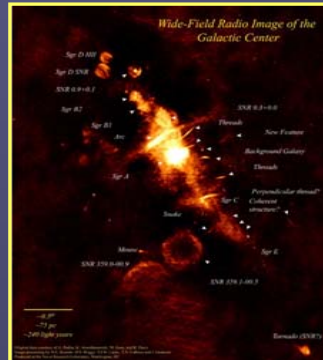
AGNs



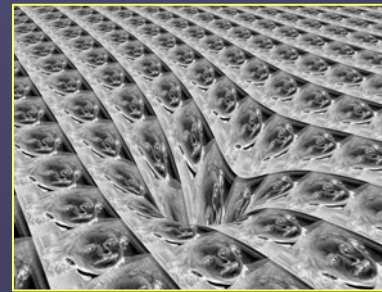
GRBs



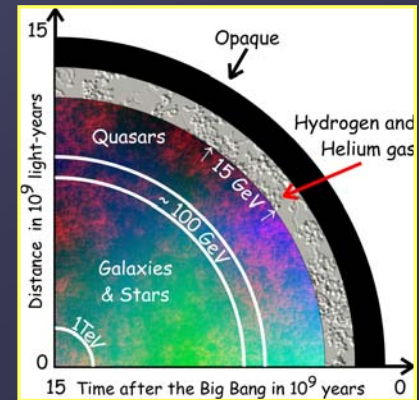
Origin of
cosmic rays



Dark matter

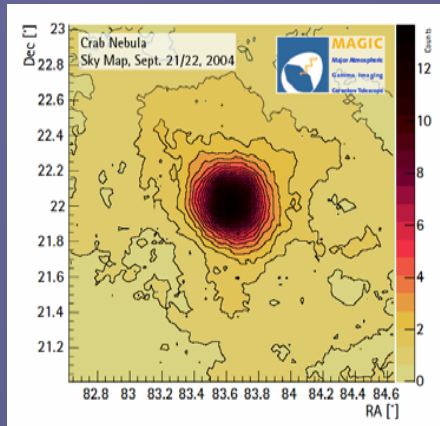


Space-time
& relativity

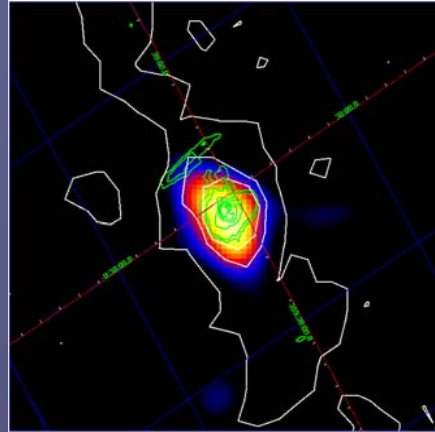


Cosmology

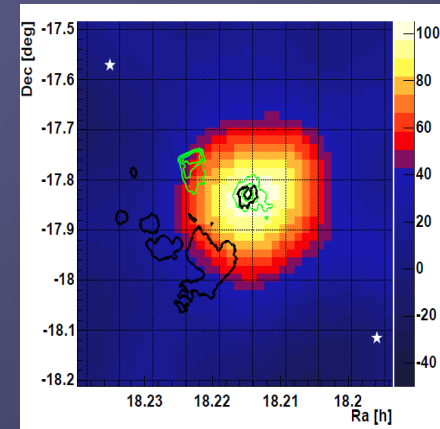
MAGIC Highlights in Galactic source observation



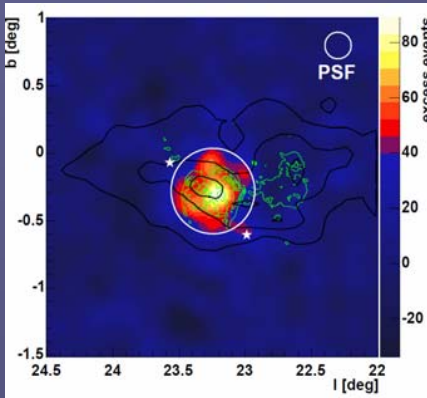
Crab Nebula



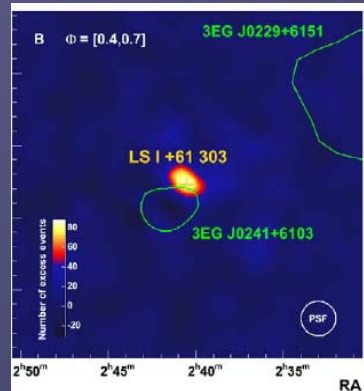
Galactic Center



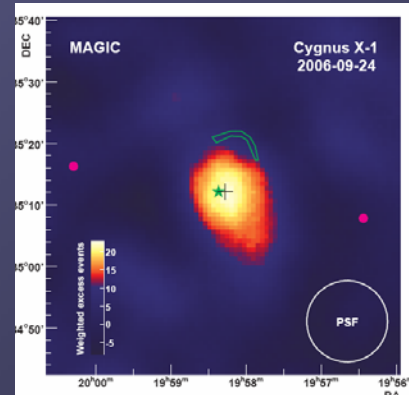
HESS J1813
PWN?



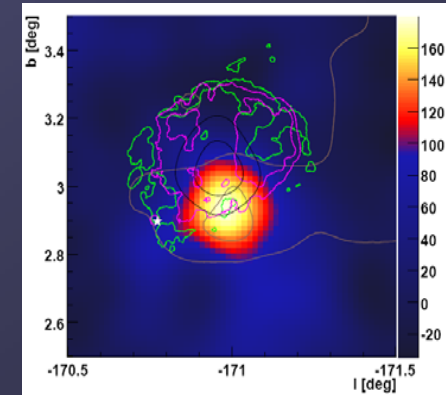
HESS J1834
¹³CO cloud



LSI+61 303 Binary
New Source
Discovered by MAGIC

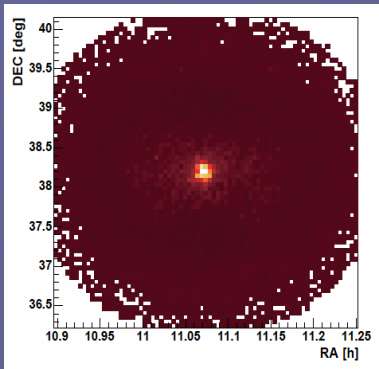


Cyg X-1 Binary
New TeV Source
evidence by MAGIC

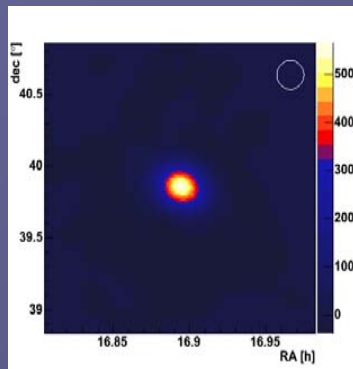


IC443
(MAGIC J0617+225)
New Source discovered
by MAGIC

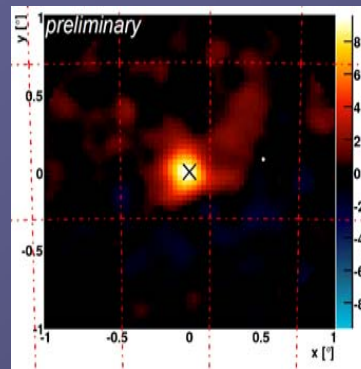
MAGIC Highlights in extra-galactic source observation



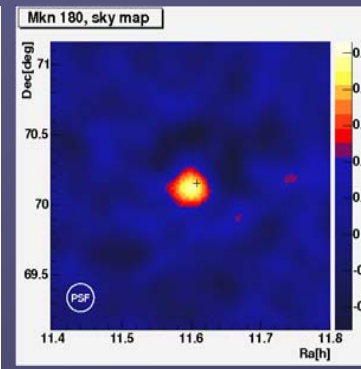
Mrk421 (0.031)



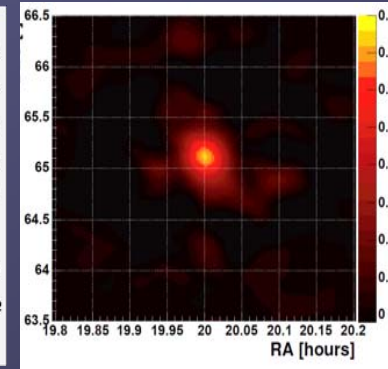
Mrk501 ($z=0.034$)
Very fast flare



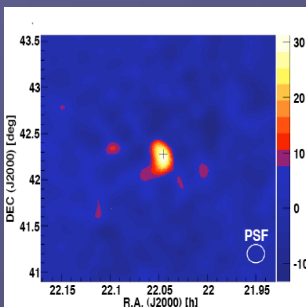
1ES2344 ($z=0.044$)



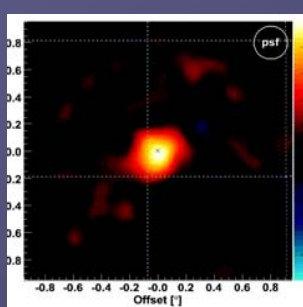
Mrk180 (0.045)
MAGIC discovery



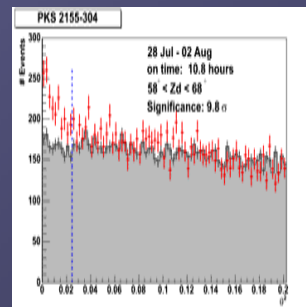
1ES1959 (0.047)



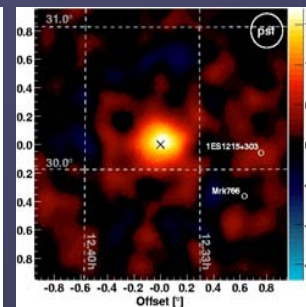
BL-Lacertae (0.069)
MAGIC discovery



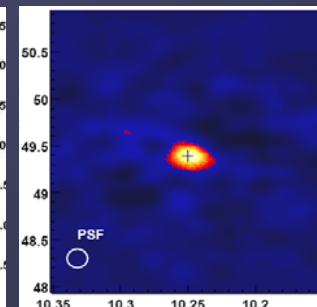
PG 1553 ($Z>0.09$)
MAGIC discovery



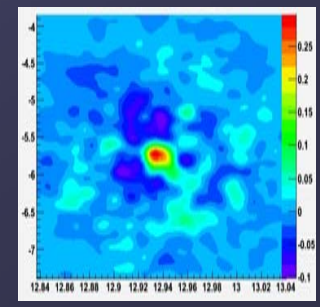
PKS2155 (0.116)



1ES1218 (0.18)
MAGIC discovery



1ES1011 (0.212)
MAGIC discovery



3C279 (0.538)
MAGIC discovery

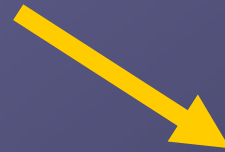
Outlook in the next 10 years

Next generation HE Gamma ray Observatory

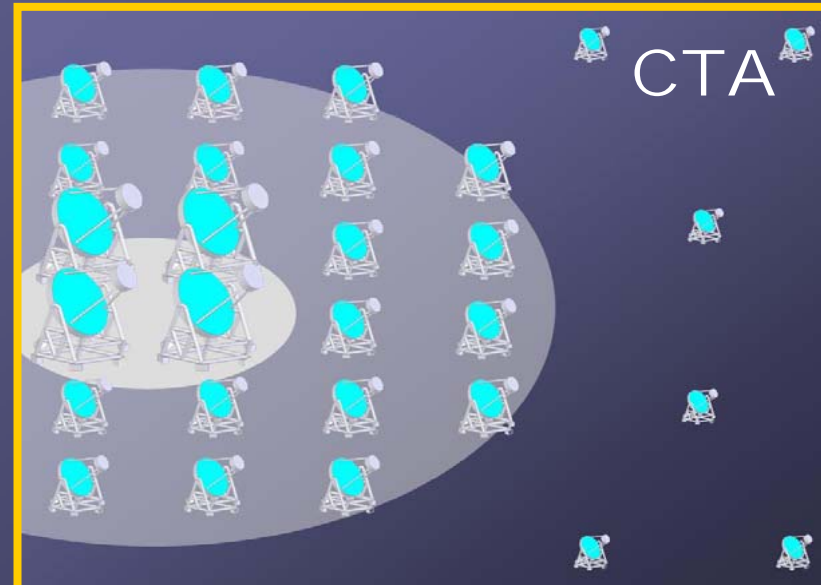
MAGIC Phase II (MAGIC-I + MAGIC-II) in 2008
50-100 sources will be discovered



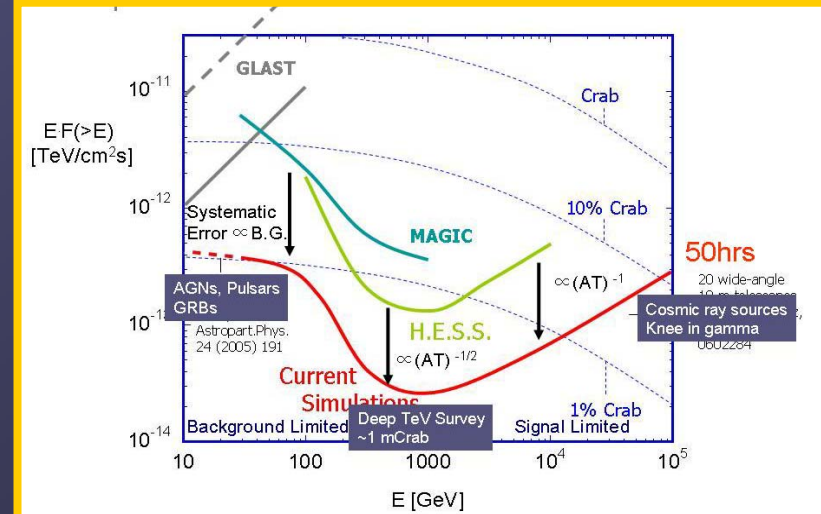
~400 scientists
~50 institutions



CTA (See the detail in poster presentation)
1000 sources will be discovered



HESS Phase II (HESS + 28m Telescope) in 2009



Astronomers in EU

US, JAPAN

JEM-EUSO Mission

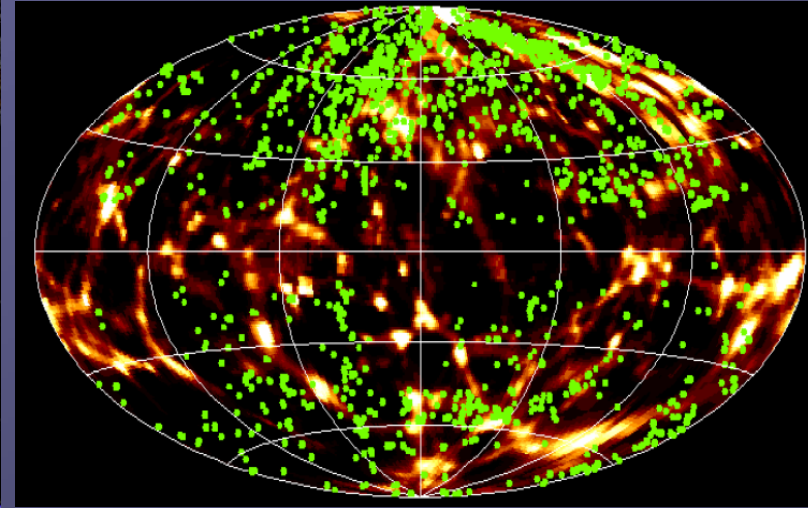


Astronomy with UHECRS

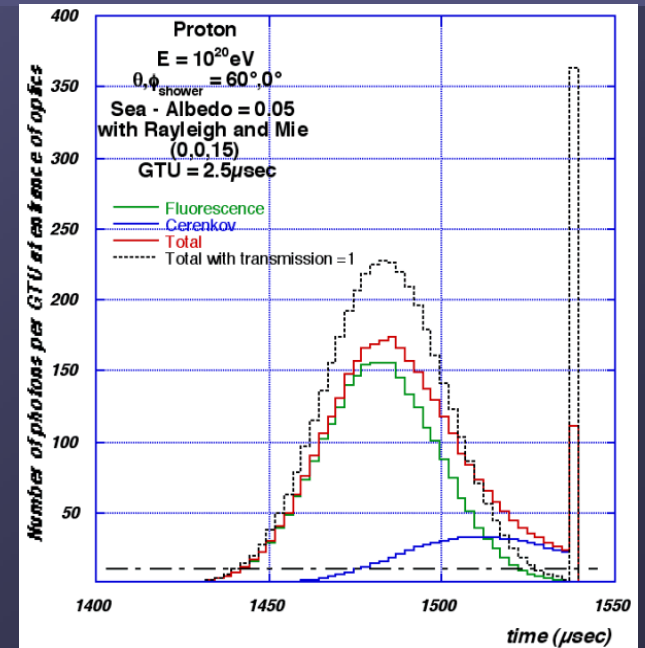
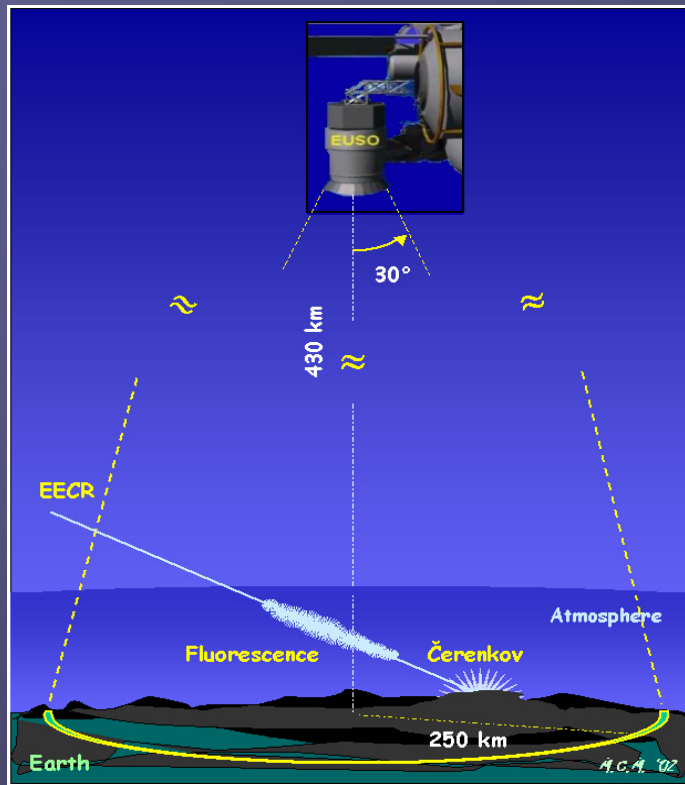
JEM-EUSO



Matter ($<90\text{Mpc}$), Galaxies ($<45\text{Mpc}$) by A.Kravtsov



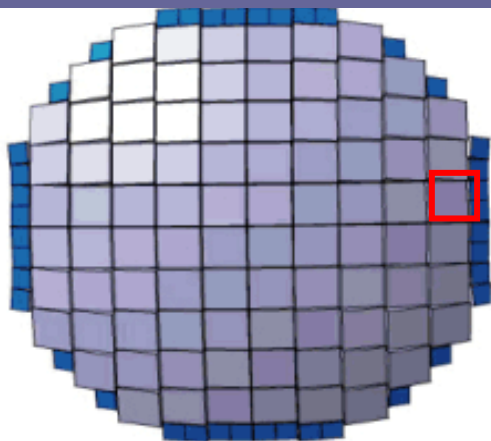
X30 Auger South
 UHECRs $2 \times 10^6 \text{ km}^2 \text{ sr year}$
 UHE ν 20 T-Ton year



JEM-EUSO Focal Surface

Focal Surface detector

(164PDMs = 0.2M pixels)



Elementary Cell
(2x2 PMTs = 144 pixels)

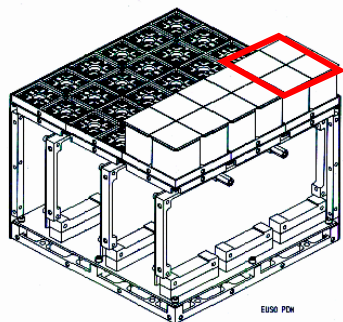
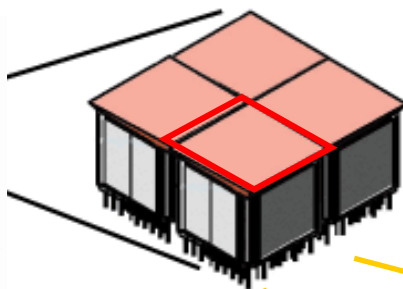
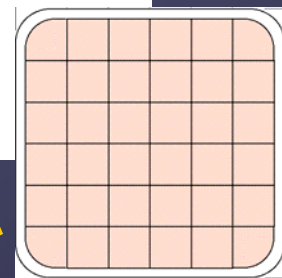
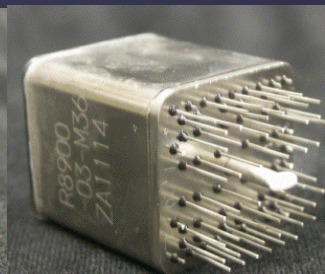
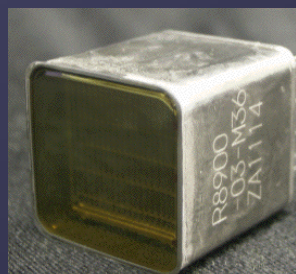
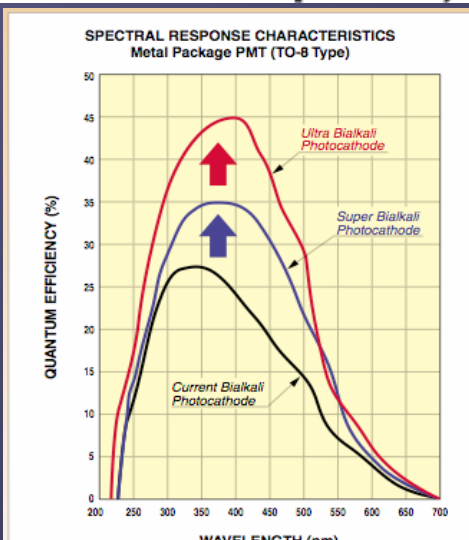
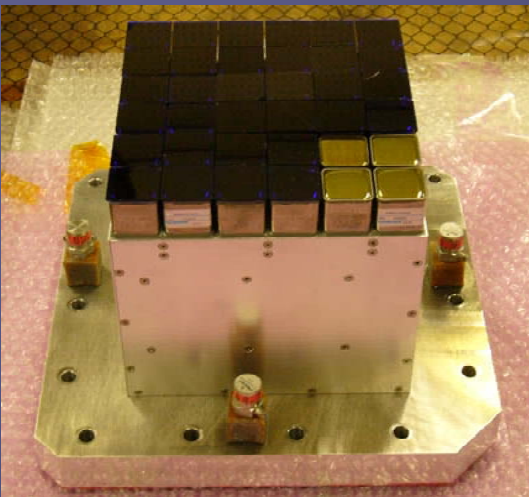


Photo-Detector Module
(3x3 ECs = 1296 pixels)

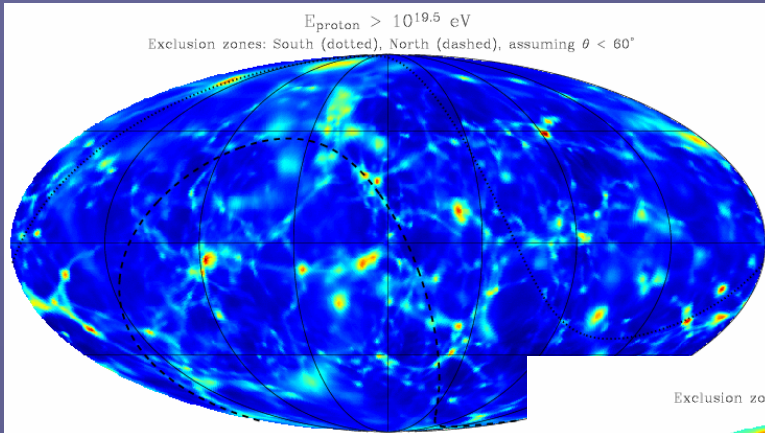
MAPMT
(6x6 pixels)



26.2 mm

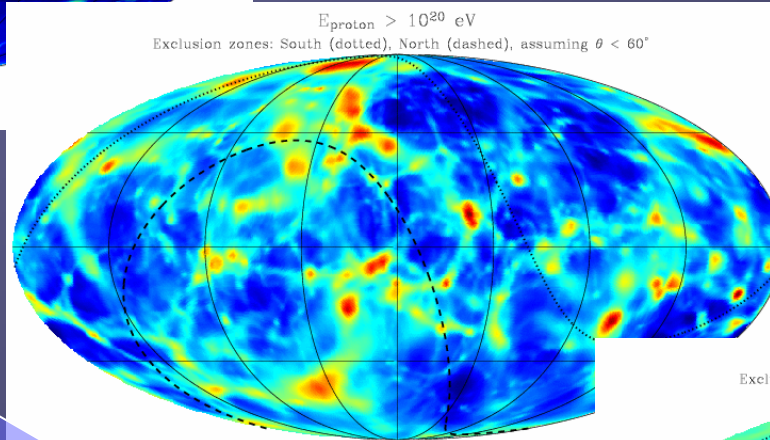


Sky maps assuming a continuous source distribution (E. Armengaud & A. Olinto)

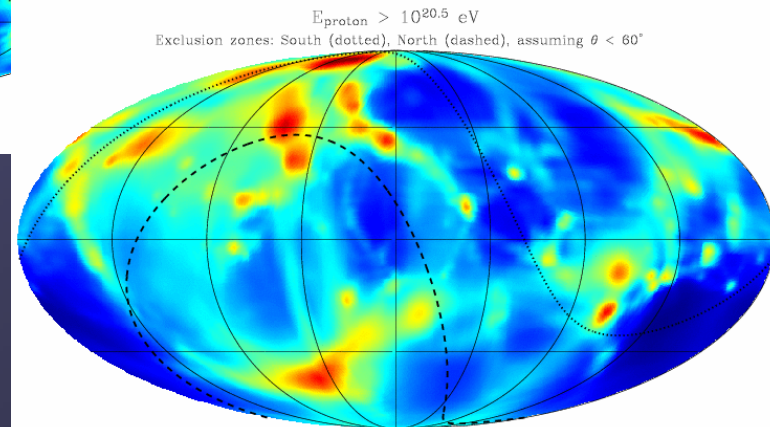


$E > 10^{19.5} \text{ eV}$

$E > 10^{20} \text{ eV}$

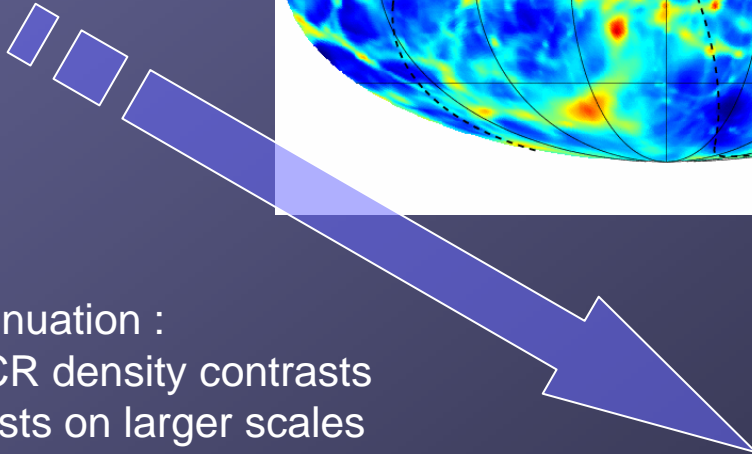


$E > 10^{20.5} \text{ eV}$



GZK attenuation :

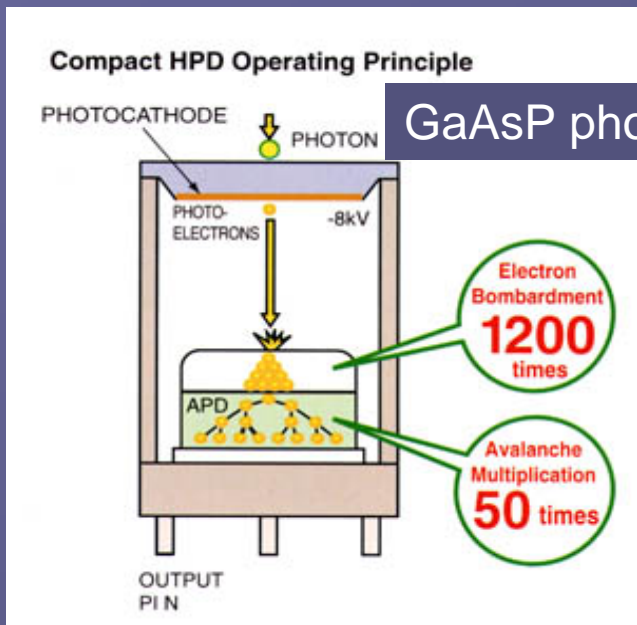
- larger CR density contrasts
- contrasts on larger scales



Photodetector Development

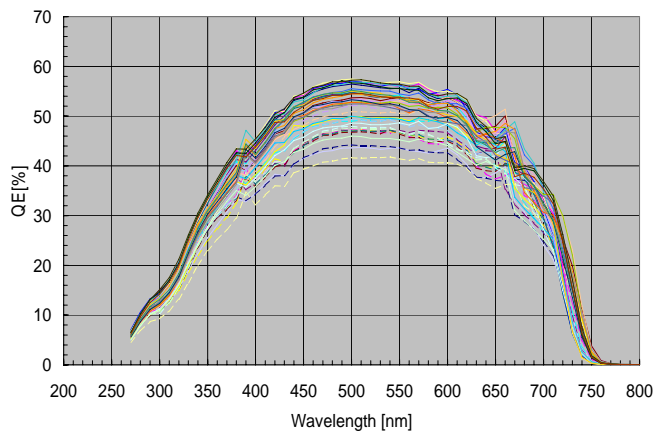
Vacuum detector HPD R9792U-40

18mm GaAsP HPD by Hamamatsu



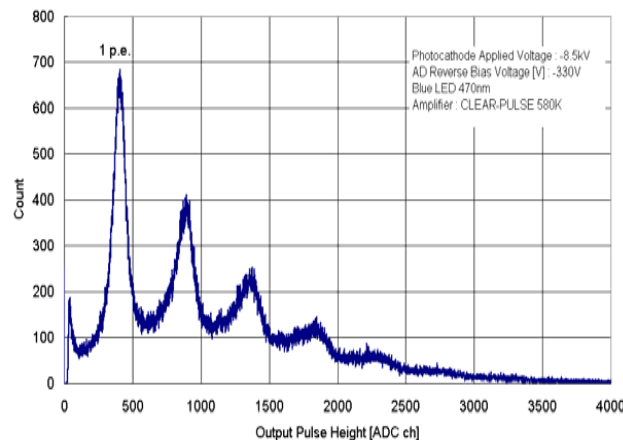
High Q.E.

R9792U-40分光感度特性(44本)



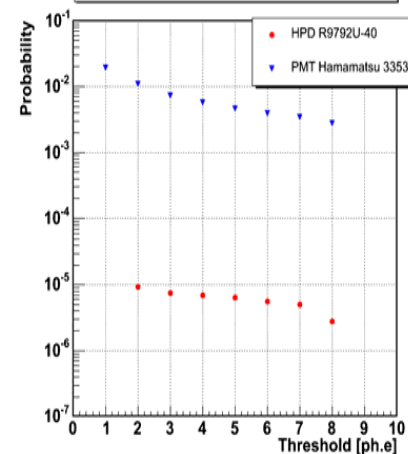
Good Charge Resolution

PHD : MHP0015

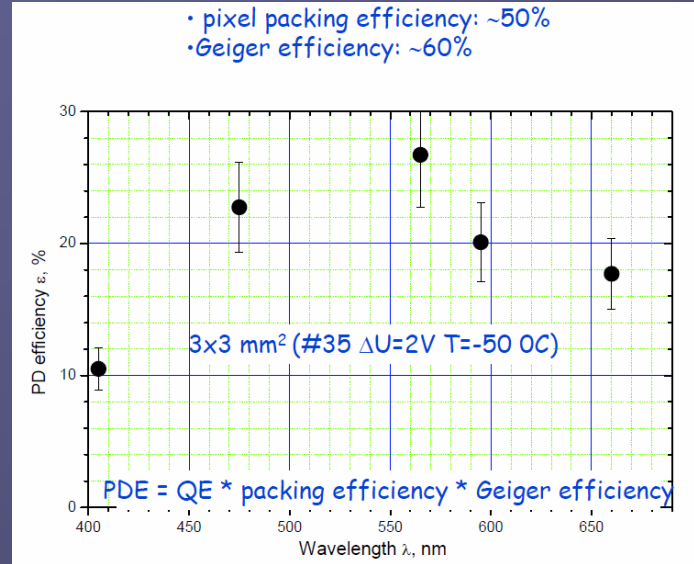
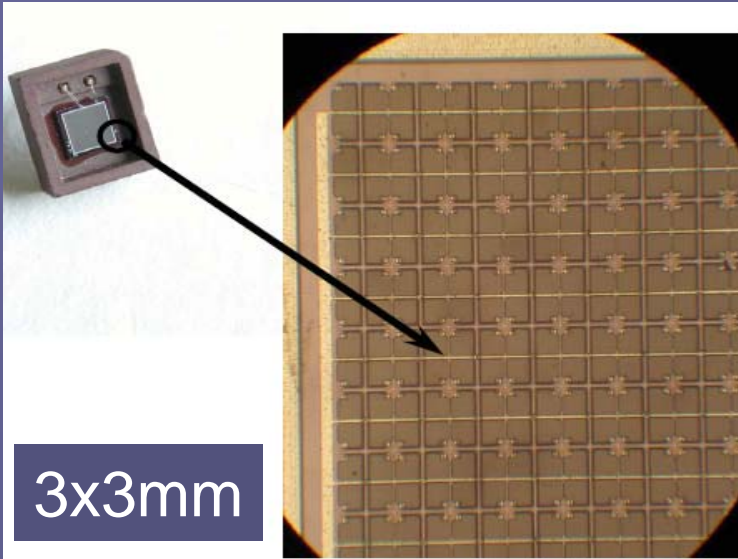


Very low after pulse rate

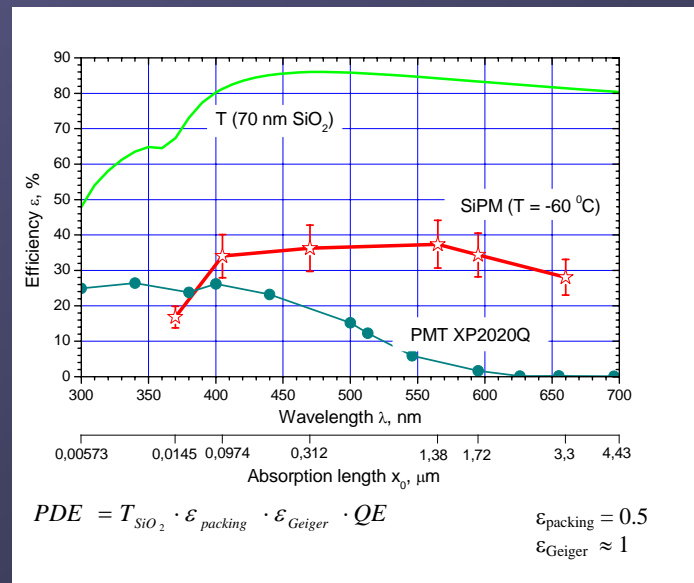
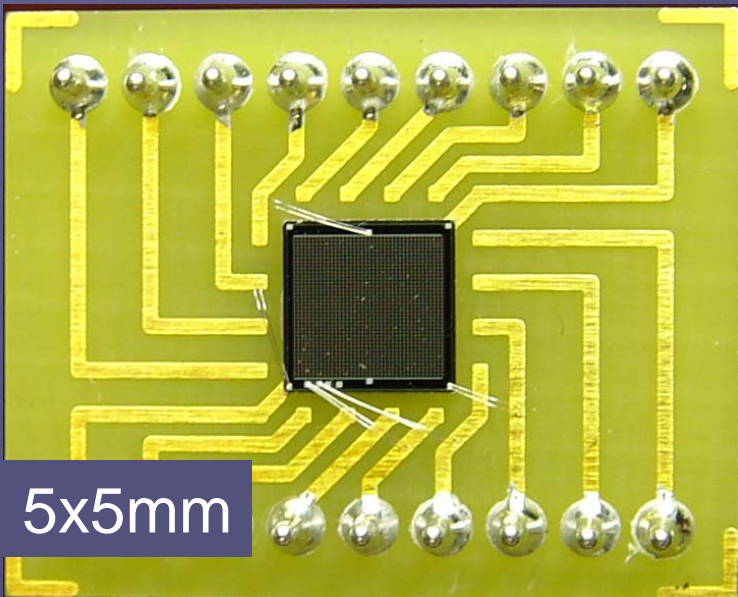
Cumulative Afterpulse Probability



Larger size SiPM by MEPhI & MPI



PDE ~ 26%



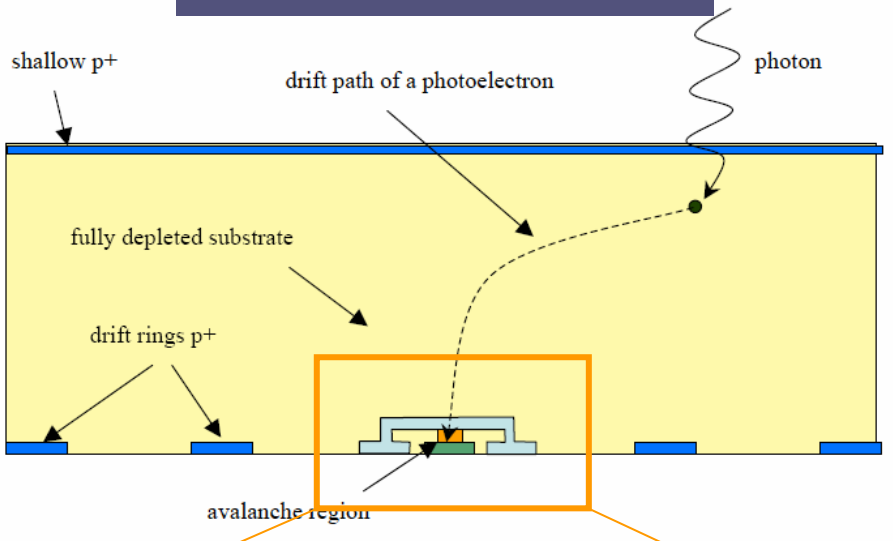
PDE > 36%
-60 deg.

$$PDE = T_{SiO_2} \cdot \epsilon_{packing} \cdot \epsilon_{Geiger} \cdot QE$$

$\epsilon_{packing} = 0.5$
 $\epsilon_{Geiger} \approx 1$

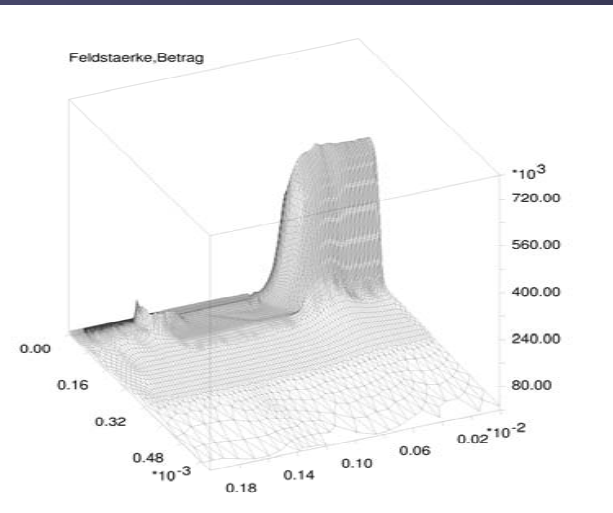
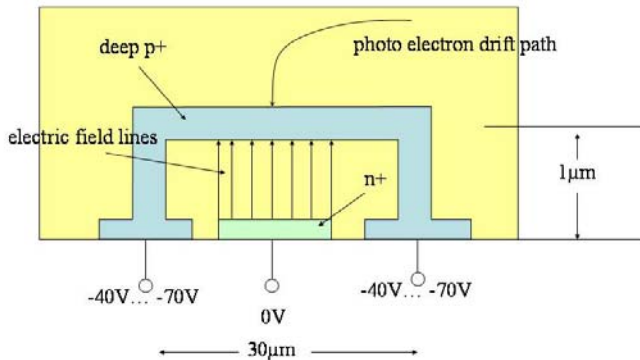
MPI-HLL Back illumination SiPM

Structure of Micro-Pixel



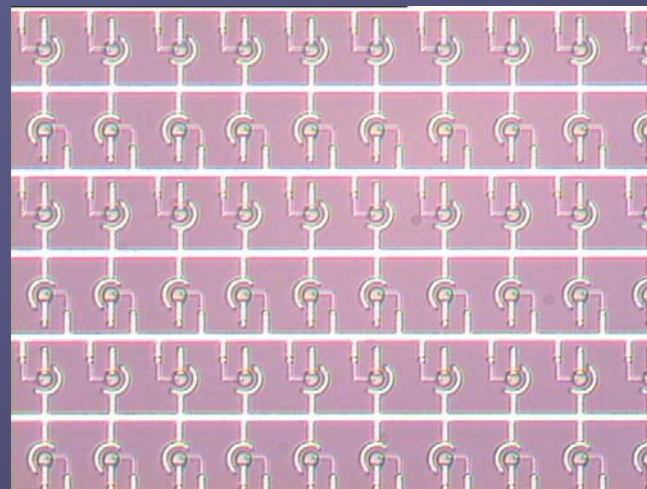
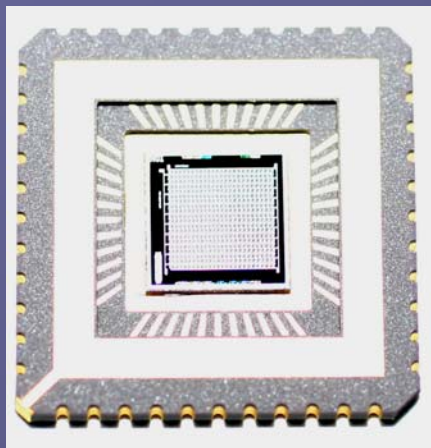
Electric field structure of Micro-Pixel

Avalanche Region

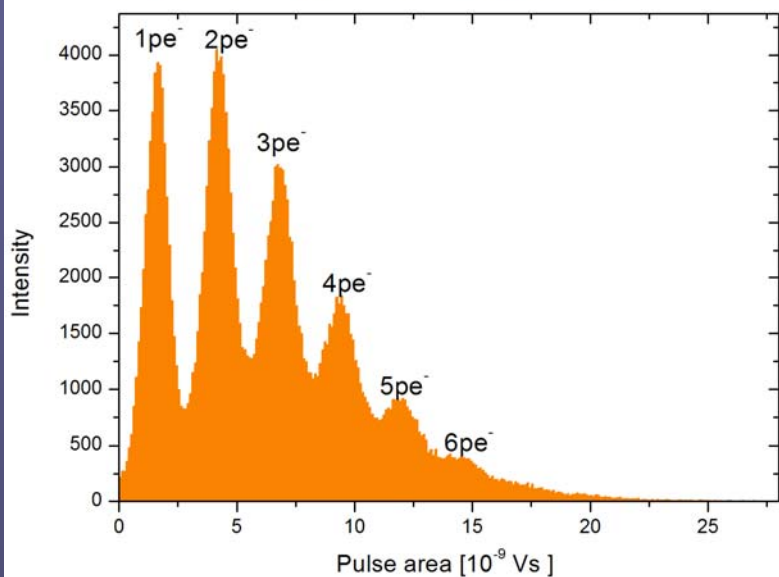


Array 20x25 of Avalanche region (no drift volume)

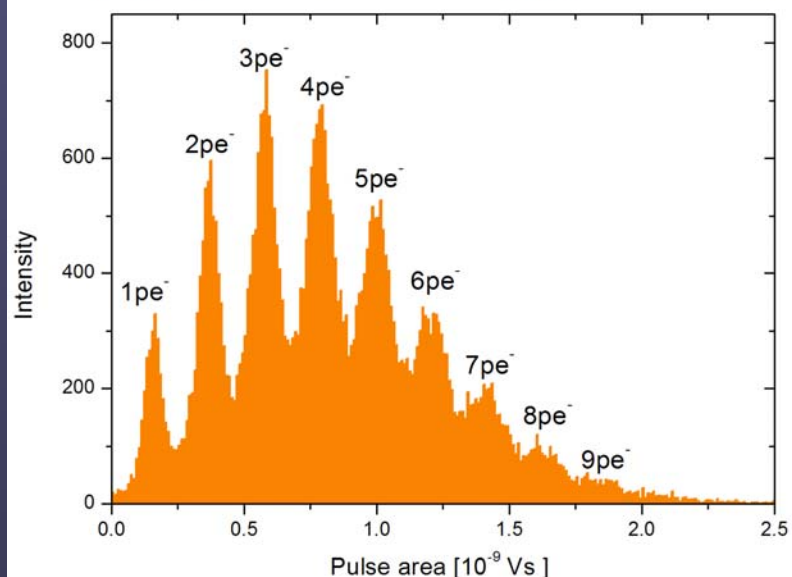
$10\ \mu\text{m}$ and $25\ \mu\text{m}$



HF region $R=5\ \mu\text{m}$ $\Delta V=13\text{V}$ laser (682nm 20ns width)



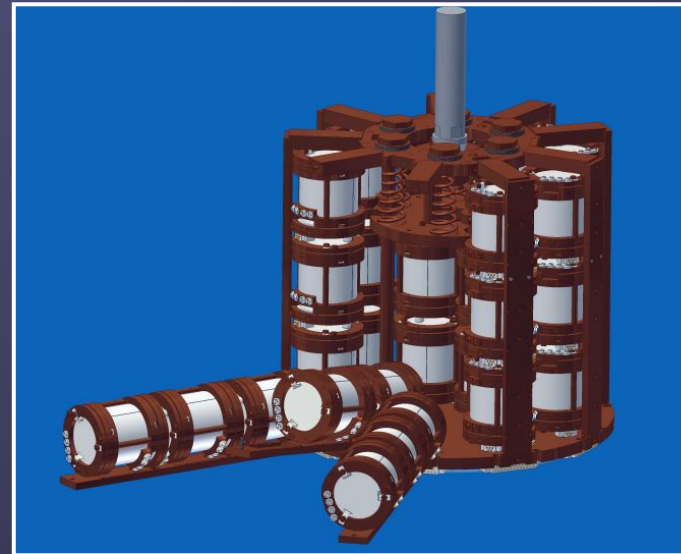
HF region $R=12.5\ \mu\text{m}$ $\Delta V=4\text{V}$ laser (682nm 10ns width)



CRESST

Dark Matter Search

Gran Sasso underground laboratory

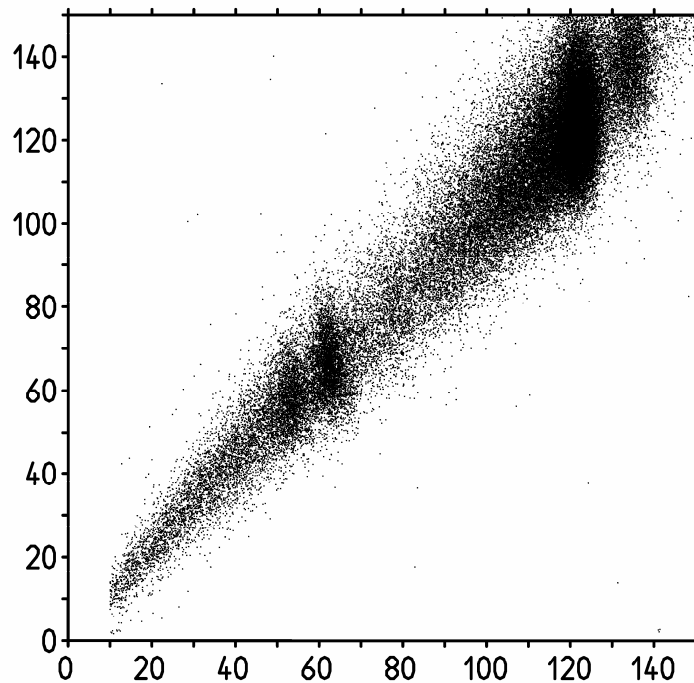




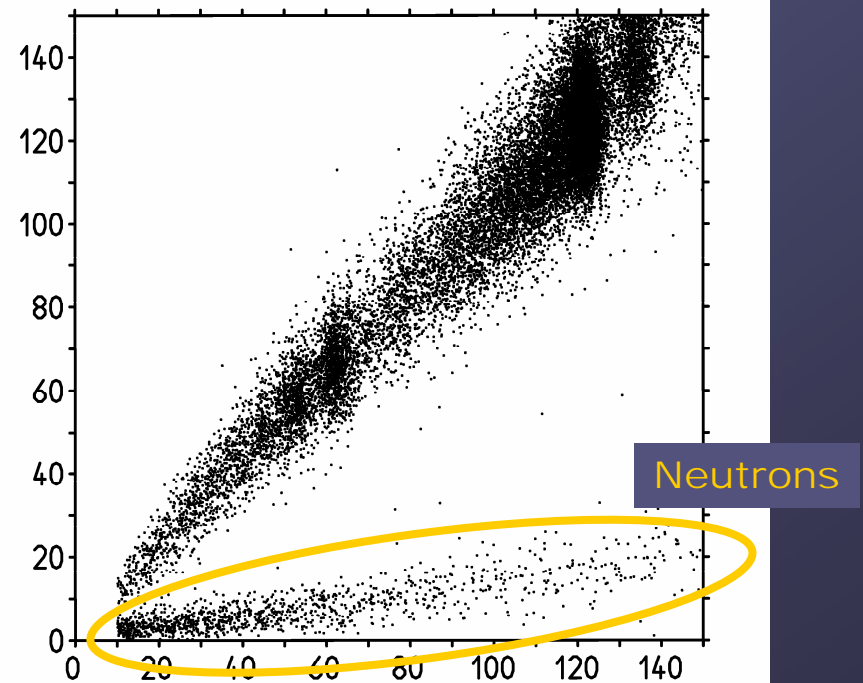
CRESST

Proof of principle

Irradiation with γ and e^-

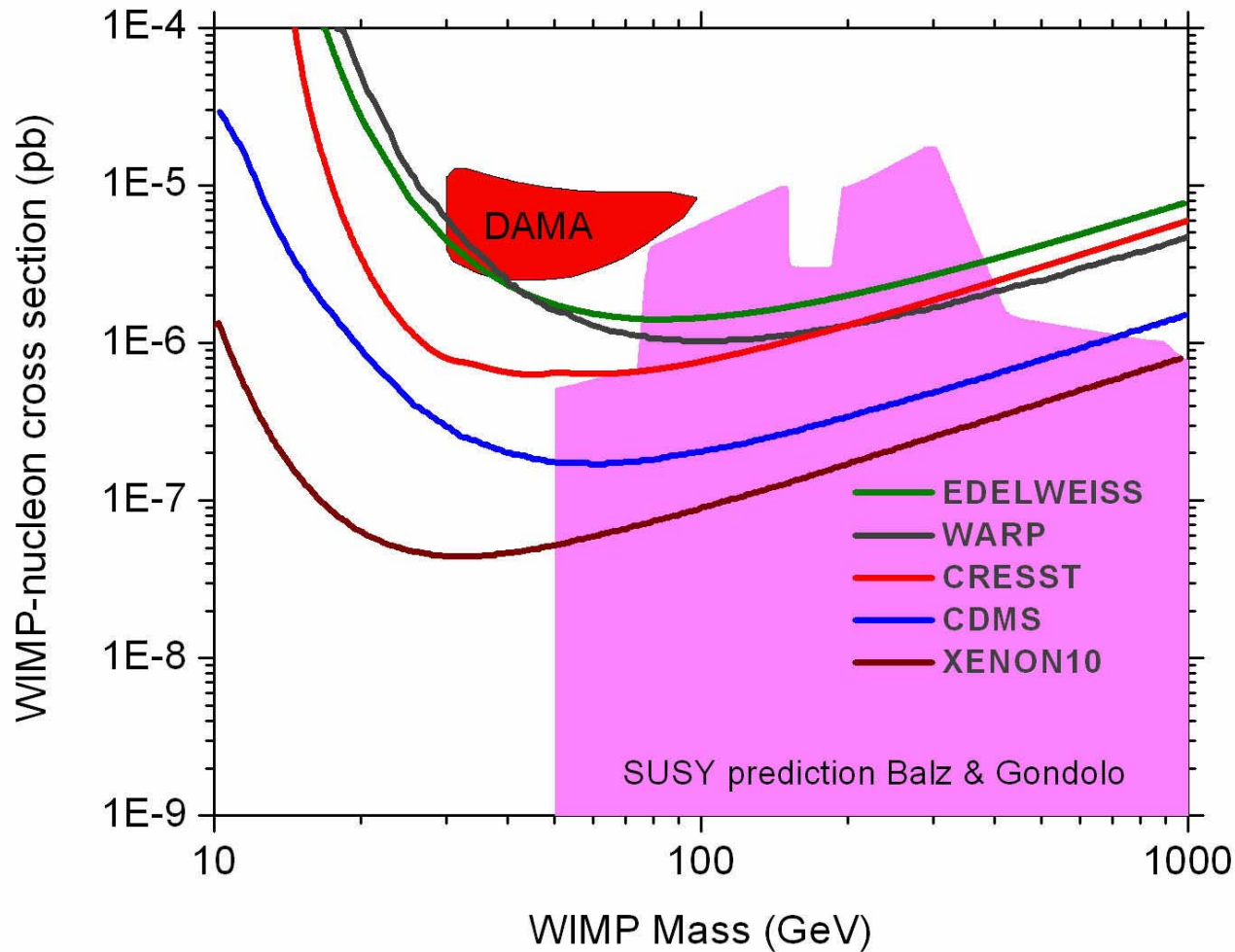


Irradiation with e^- , γ and n



Efficient discrimination power of e^- and γ background above 15 keV

New upper limit



Conclusion

- Please enjoy the workshop.
I wish the success of the workshop!!
- Do not drink beer too much in the excursion.

Thanks