GridPix in cool Xe or Ar for the XENON experiment

Usage of the GridPix in a noble liquid WIMP detector

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Outline

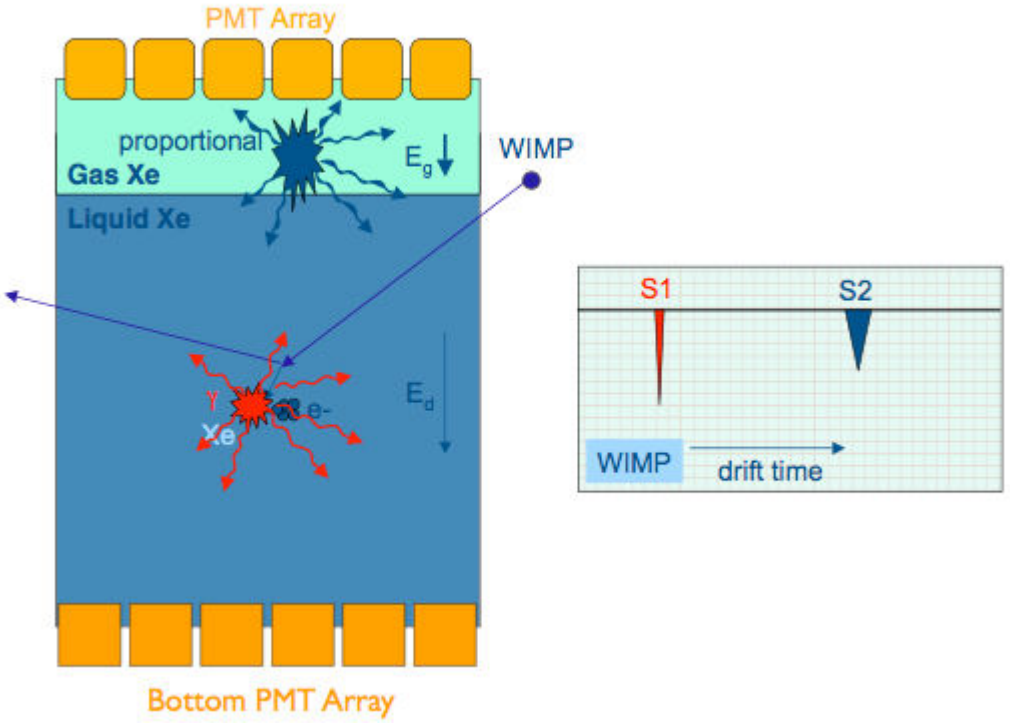
- Working of noble liquid WIMP detectors
- Using the GridPix in said detectors
- Xenon Test project
- Conclusions

Noble Liquid WIMP Detectors

- DARWIN proposal
- Dark matter
  - Leading candidate: WIMPS
- Noble liquids
- Ongoing projects
  - WARP
  - Xenon10 / Xenon100 / Xenon1T

WARP and Xenon

- Basic inner workings are identical



Source: Direct Searches for Dark Matter, Elena Aprile, EPS - HEP, July 21 2009, Krakow, Poland

WARP and Xenon

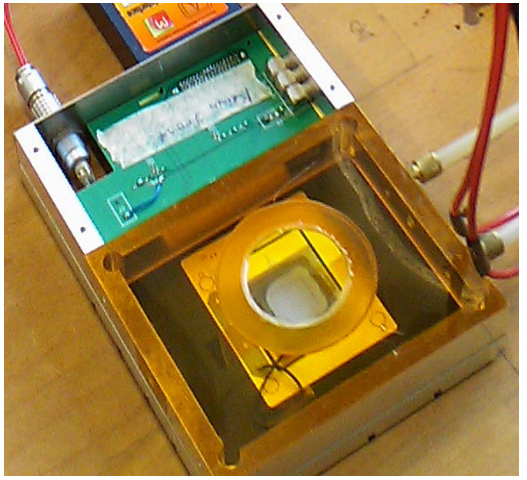
- Different interactions have different signatures
- Distinction of WIMP events through S1/S2 ratio and drift time

- Electrons are only used for indirect detection through scintillation

Using the GridPix

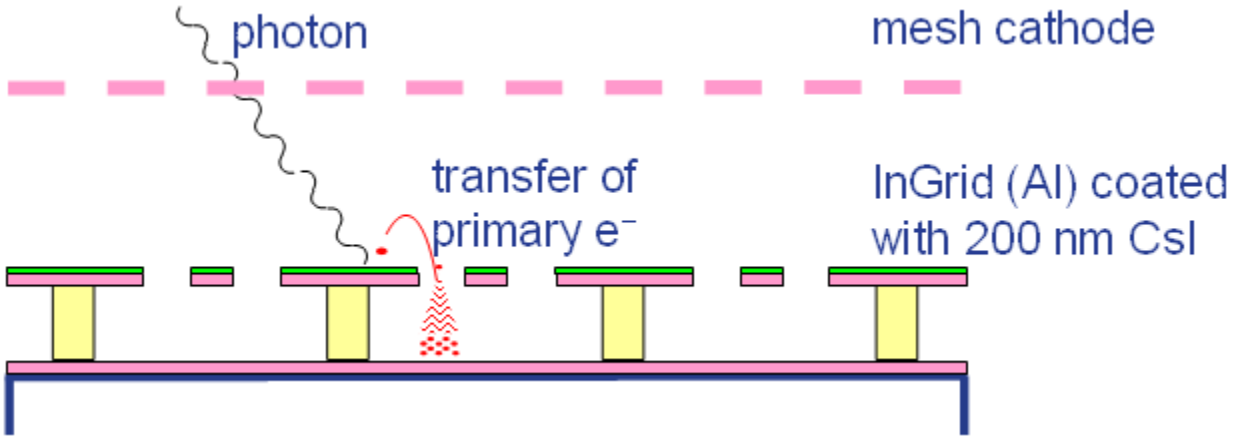
- Using the GridPix detector, these electrons could be seen
- Replace top PMT layer with GridPix detectors
- More and more exact information can be mined

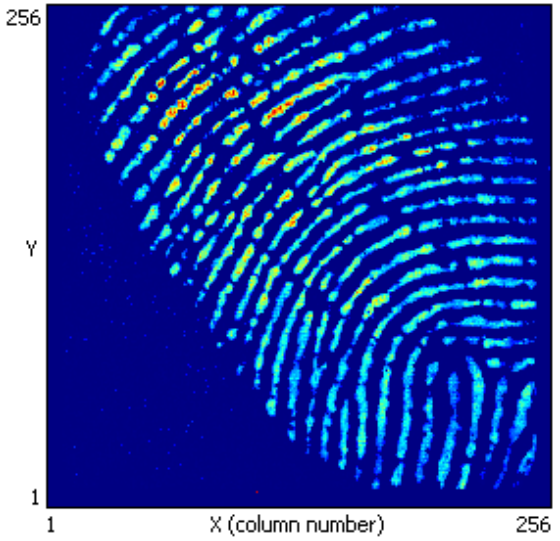
Expanding GridPix?



- Photoelectric effect
- Future possibility:

  CsI layer on grid



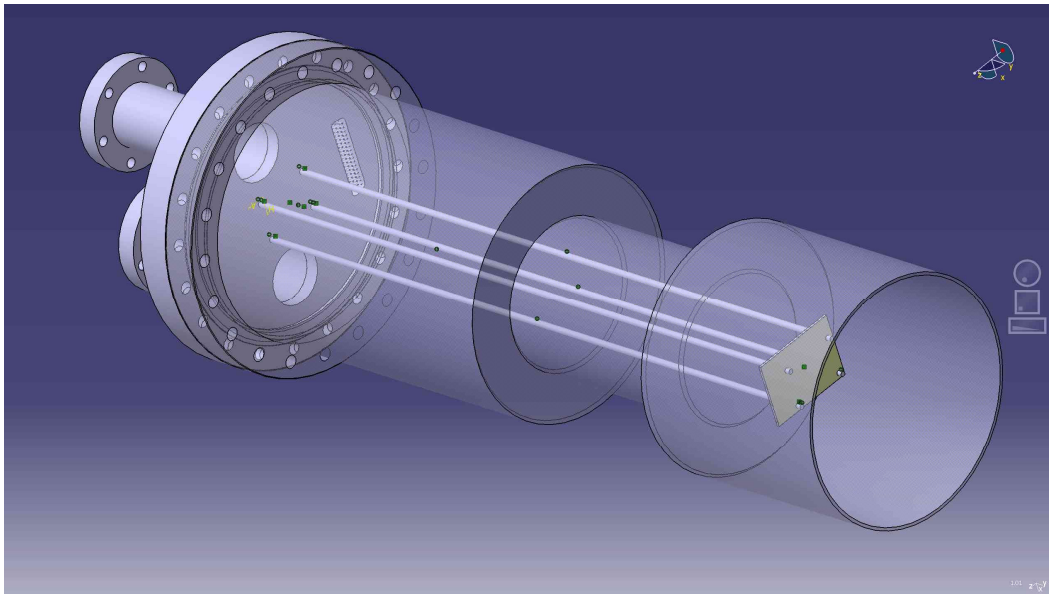


GridPix in Xenon

- Easiest way: just do it
- In the works: designing and building a test setup to put the GridPix in a LXe environment
- ETA: early 2010

Gridpix in Xenon: Test setup

- Most components are ordered and / or being made



Problems for Xenon Test

- Cold environment: ~170-200K (Xenon)
  ~90-110K (Argon)
- Low outgassing materials necessary or at least preferable
- GridPix usually uses a quencher gas

Future possibilities for GridPix in noble liquid detectors

- Liquid multiplication?

Conclusions

- Test setup is being constructed
- GridPix is a promising candidate to improve noble liquid WIMP detectors:
  - High single electron efficiency
  - Photon sensitivity?

Thanks for listening!

- Questions?