

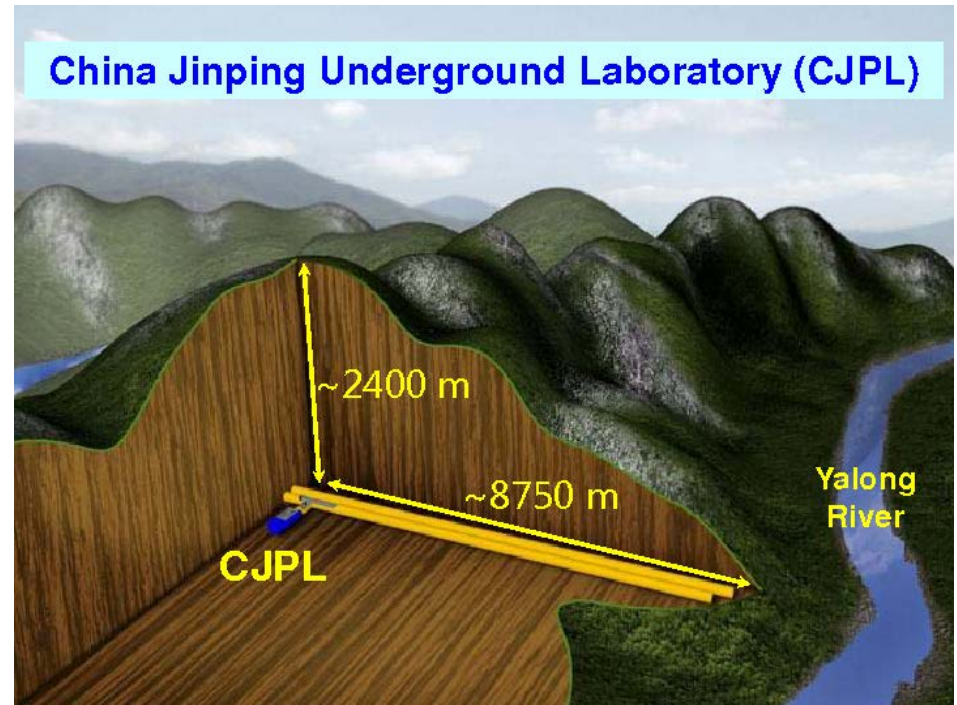
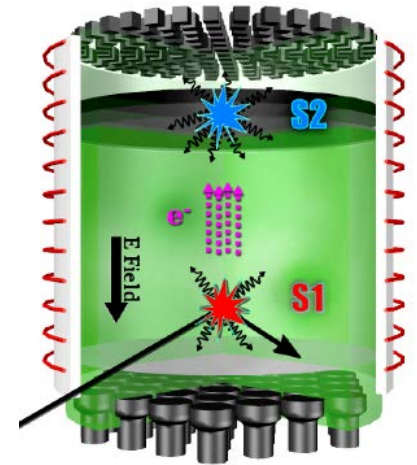
DARK MATTER TO ENERGETICS

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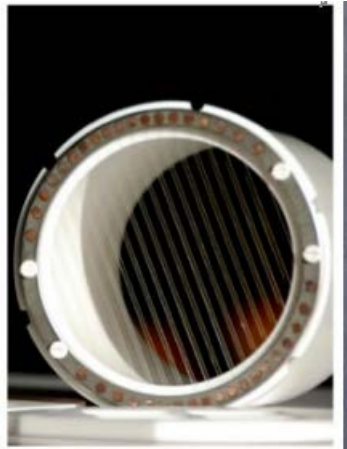
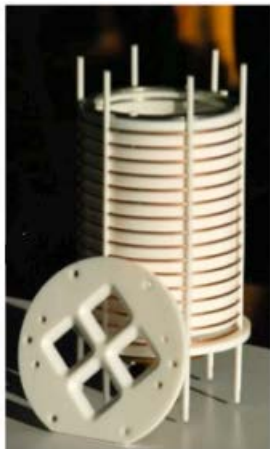
PandaX Background

- Dark Matter Exists
- Searching for WIMPS
 - Weakly Interacting Massive Particles
- PandaX located under 2400 meters of marble
 - Very little background
 - 20 muons/m²/100days
- Detection of WIMPS
 - Liquid Xenon
 - TPC detects light



MPanda

- Smaller Michigan PandaX prototype
 - Works like PandaX but with 4 PMTs
- Not large enough to detect WIMPs
 - Used to streamline PandaX



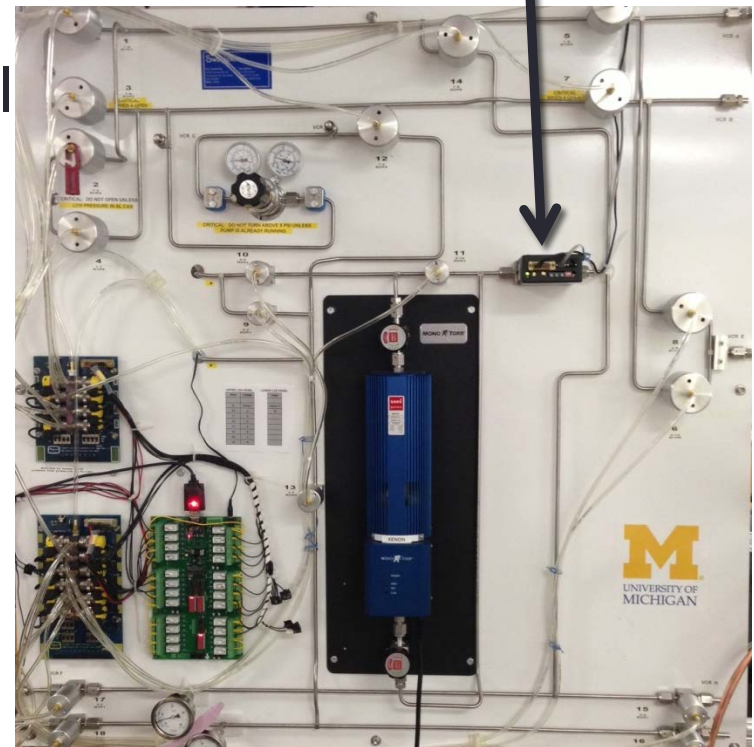
MPanda



Flow control

- Needed an efficient way to control gas flow
- Flow controlled by turning valve
 - Change not known for a few hours
 - Inaccurate
- Flow meter/controller on gas panel
 - Needed to be programmed

Flow controller



Feed through

- Signals did not look as expected
- Need to test the PMTs
 - LED inside TPC
 - Take apart TPC to change LED
- Design fiber optic feed through
 - LED outside of TPC
 - Light diffused using Teflon sphere



Nitrogen Triiodide Explosion



Danger in Ports

- Over 8 million shipping crates through LA port yearly
- 5-6 million crates through Long Beach and NY each year
- Do we test each crate for explosives?
 - No, far too expensive
- Current technology:
 - Helium-3
 - Extremely expensive
 - Can only spot check crates
 - Boron detectors
 - Expensive
 - Lithium doped scintillators
 - Expensive
 - Bad S/B



Wikipedia

Detection of Radioactive Sources

- New Idea: substance that can be detonated by neutrons
 - Cheap
 - Stable
 - Detonate from one neutron
- Two different energetics
 - Nitrogen triiodide
 - Detonated by touch of feather
 - Primary explosives
 - Stable with a high energy yield

Primary Energetics

- CL-20, DAAF, FOX7, HMX, HNFx, HNS, NTO, PETN, RDX, DADP, TATP, TNT
- Experiment:
 - Milligram amounts of 12 energetics placed on radioactive sources
 - Received between 40-96 million neutrons over night
 - None detonated



Nitrogen Triiodide

- Extremely sensitive
- Experiments in 1922 determined NI₃ detonated by alpha particles
- Determining properties
 - Evaporation of NH₃ fast
 - Explosive within 30 minutes of making
- Future experiment
 - Combine NI₃ with lithium or boron compound
 - Li or B compound react with neutron

Thank you!

- I'd like to thank Tom Schwarz, Mike Schubnell, Curtis Weaverdyck, Greg Tarlé, Cağlıyan Kurdak, and Myron Campbell.

Cheers!

