



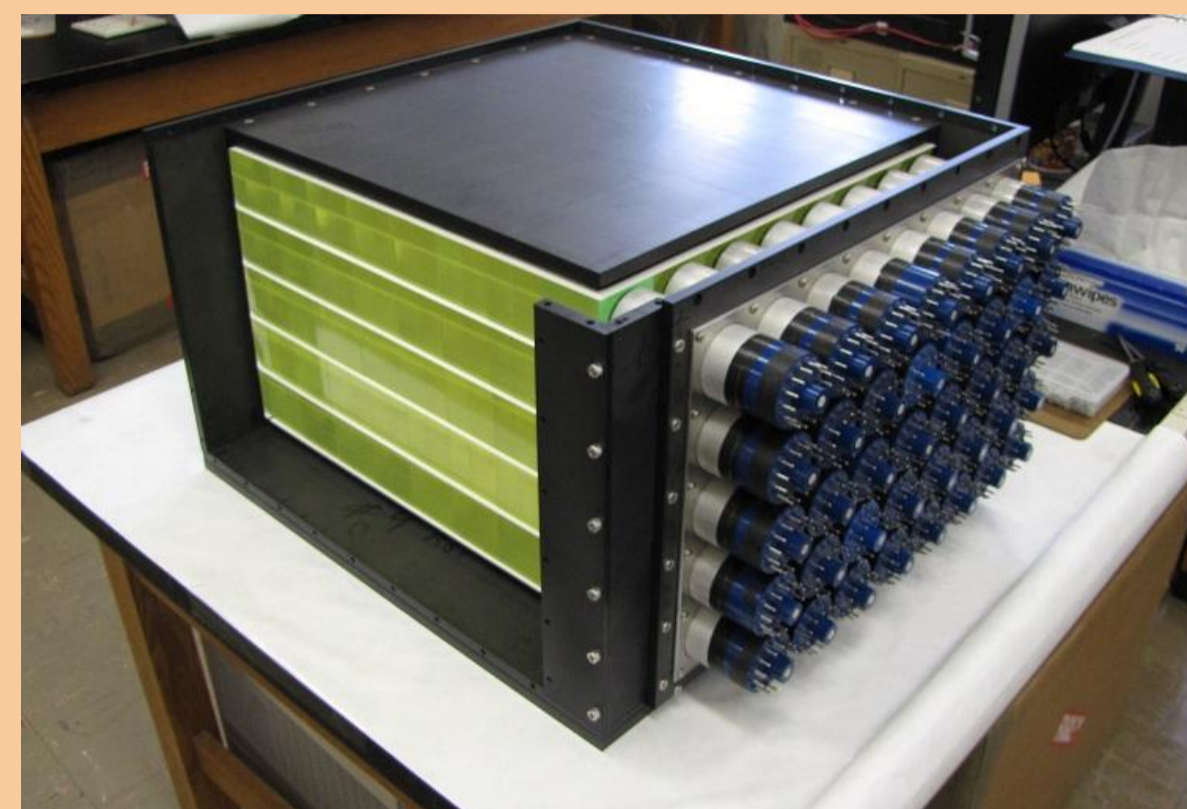
An Upgrade to miniCHANDLER



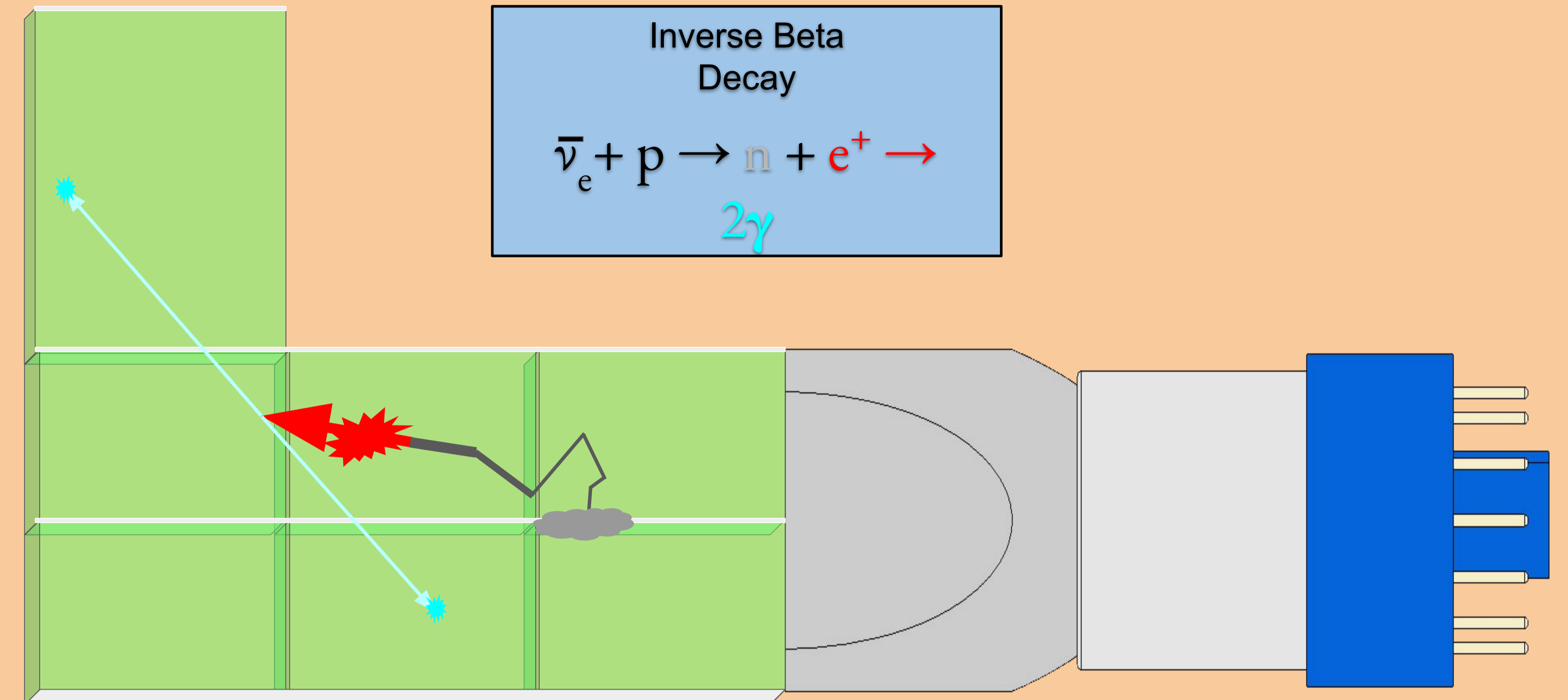
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miniCHANDLER

- Prototype for full CHANDLER
- 8x8x5 volume of 6.2 cm scintillator cubes and 80 photomultiplier tubes (PMTs)
- Built to detect inverse beta decay ($p + \bar{\nu}_e \rightarrow e^+ + n$)



- Lithium sheets capture neutrons while positron annihilation gammas are tagged to do coincidence cuts
- To further reduce background a distance cut from the neutron to positron is also applied



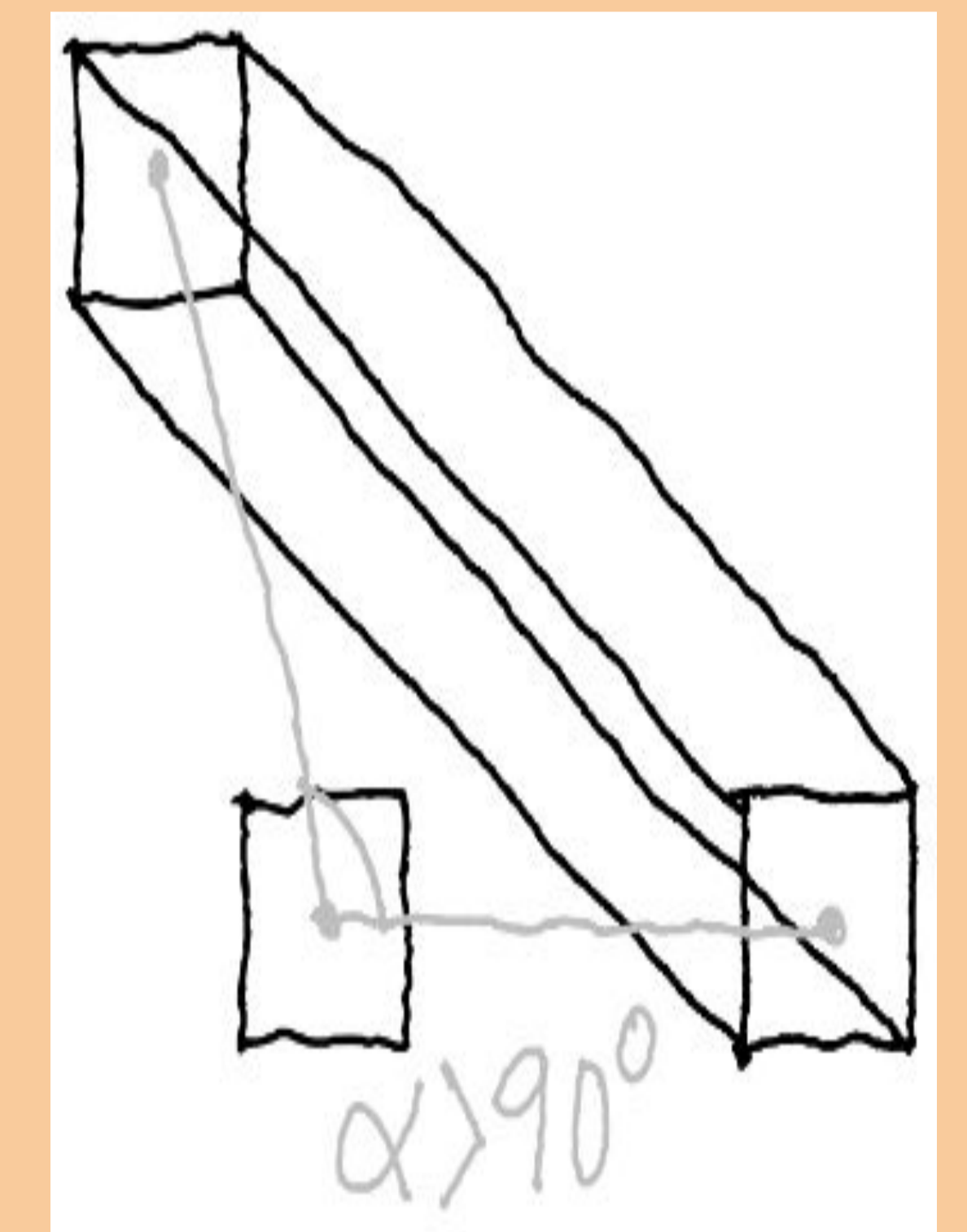
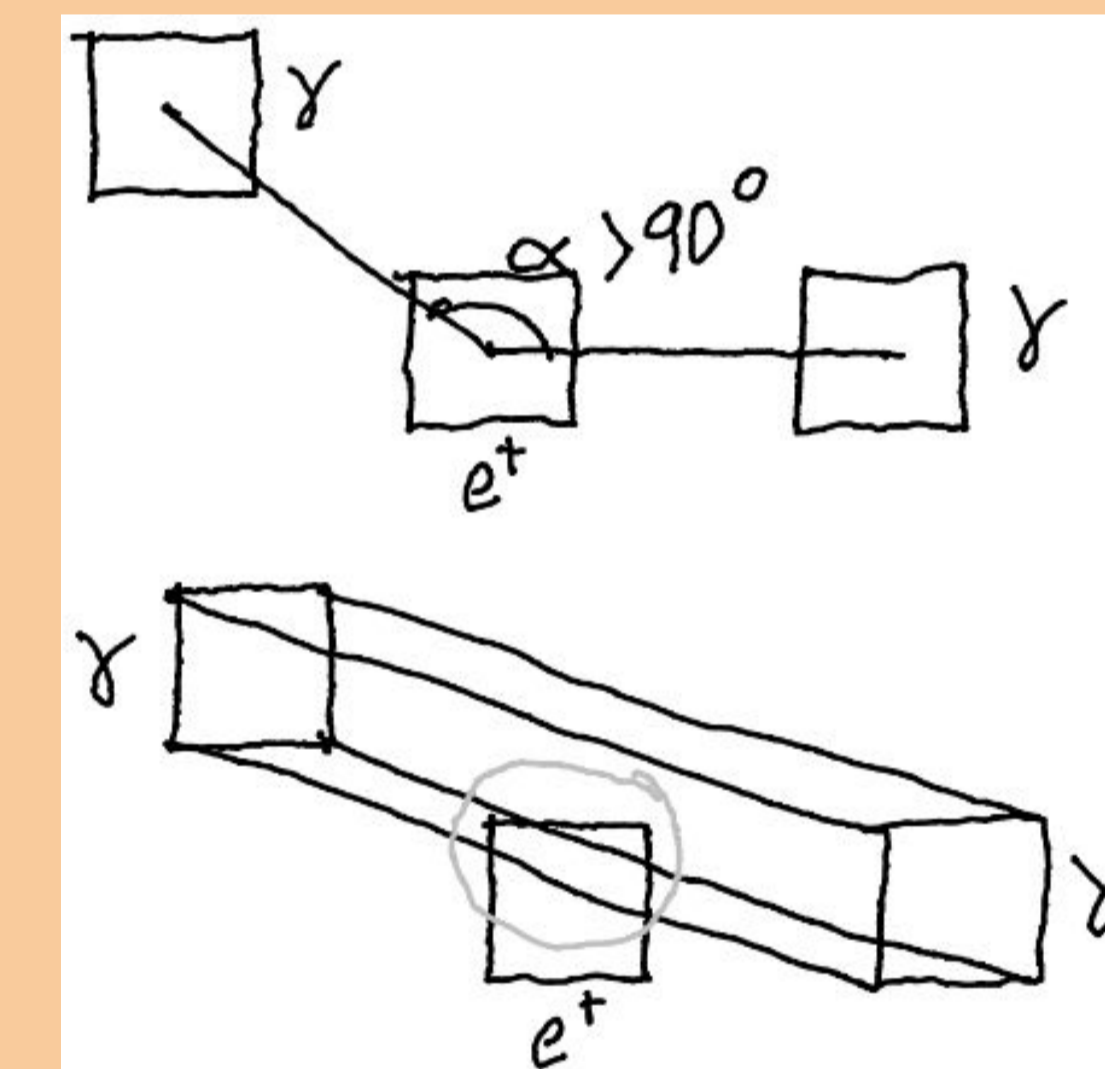
Upgrades

- This upgrade focuses on increasing light collection
- New light guides increase light collection by 30%
- A new adhesive is used to bind light guides and PMTs
- Has an index of refraction more similar to the light guides and PMTs than previous glue
- Better light collection leads to more accurate measurements of energy deposition and will allow for more accurate reconstructions



A New Way to Match Gamma Captures

- Back to back if the angle is greater than 90°
- Back to back if the line from corners intersects the initial cube
- Geometry method allows more possible scenarios and disallows more impossible scenarios



Conclusion

- The new upgrades to miniCHANDLER will make reconstruction of events where only one gamma is detected easier
- This version of miniCHANDLER will be deployed for testing in 2023
- The full sized CHANDLER will be much larger, which will prevent annihilation gammas from escaping