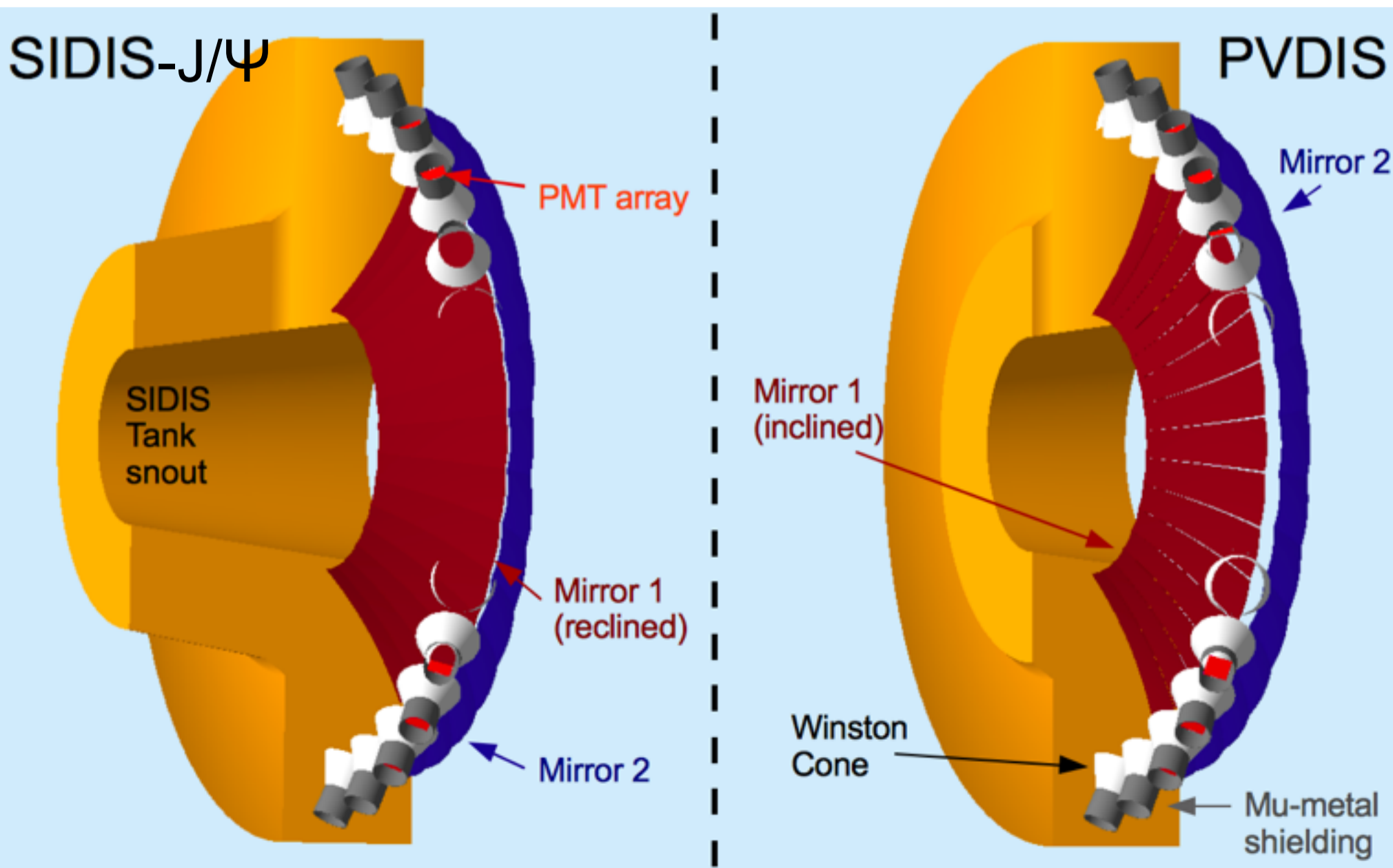


# SoLID Light Gas Cherenkov (LGC)

The LGC is a Cherenkov detector designed to be used in both primary configurations of the SoLID detector. The LGC's primary function is fast electron identification and charged pion rejection at the trigger level. It is designed to provide coverage over the full SoLID acceptance, and is subdivided into 30 identical sectors; each sector has 2 spherical mirrors designed to focus light onto an array of 9 multiannode PMTs. Half of the mirrors are designed to rotate to an inclined position, allowing for full angular coverage in both primary SIDIS-J/ $\Psi$  and PVDIS configurations. In combination with the electromagnetic calorimeter, the pion/electron separation efficiency is designed to be greater than 99 percent.



Parameter	PVDIS Configuration	SIDIS - J/ψ Configuration
Gas Radiator	65% C <sub>4</sub> H <sub>8</sub> O, 35% N <sub>2</sub> , 1atm, 25°C	100% CO <sub>2</sub> , 1atm, 25°C
Angular Coverage	22° to 35° in θ 2π in φ	7° to 15° in θ, 2π in φ
Charged Pion Threshold	3.2 GeV/c	4.9 GeV/c
Avg. Rejection Factor Below Threshold	6x10 <sup>3</sup>	3x10 <sup>4</sup>
Overall Dimensions	Inner Radius: 71cm, Outer Radius: 265cm Length: 105cm (212cm w/ snout)	
Mirror Reflective Area	Inner Mirror: 30 x 0.3 m <sup>2</sup> Outer Mirror: 30 x 0.25 m <sup>2</sup>	
Mirror Material	Reinforced Carbon-Fiber Polymer Areal Density: < 6 kg/m <sup>2</sup>	
Mirror Coating	Polished Al to 85% reflectivity MgFI protective coating	
PMTs	Hamamatsu H8500C (H12700) 64 pixel PMT array	
PMT coating	p-Terphenyl wavelength shifter provides > 20% PE yield.	
Magnetic Shielding	Mu-Metal shielding < 50 gauss both perp. and para.	

## Construction and Prototyping Strategy

- LGC group leaders: Zein-Eddine Meziani, Michael Paolone
  - PMT coating provided by Temple University
  - Components designed and assembled by Temple University.
  - Coating of mirrors provided by Stony Brook University
  - Manufacturing of mirror blanks by Composite Mirror Applications
  - Manufacturing of Mu-Metal shielding by Amuneal
- Stage I prototyping to begin immediately upon funding
  - Single sector mirror and PMT array to be used in test Cherenkov Tank
  - Components and DAQ tested parasitically during hall operation under high luminosity / high stress conditions.
- Stage II prototyping is a combined 1/6th of the final design (5 sectors)
  - Will be integrated into final construction after prototype testing.

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