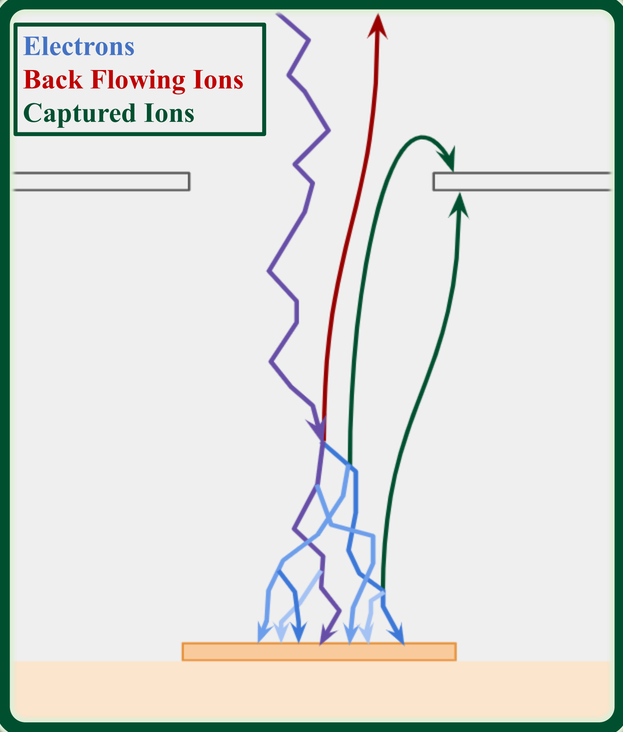
Complete Ion Screening Amplification Structure

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For more information, see Tanner Polischuck's Gaseous Detectors talk at 15:10 on Oct. 21, or contact Peter Lewis at **peter.mandeville.lewis@hawaii.edu**

We utilize **Garfield++ simulations** to investigate how a **single layer** of an integrated-grid amplification structure could be used to **significantly reduce** the fraction of **back flowing ions**.



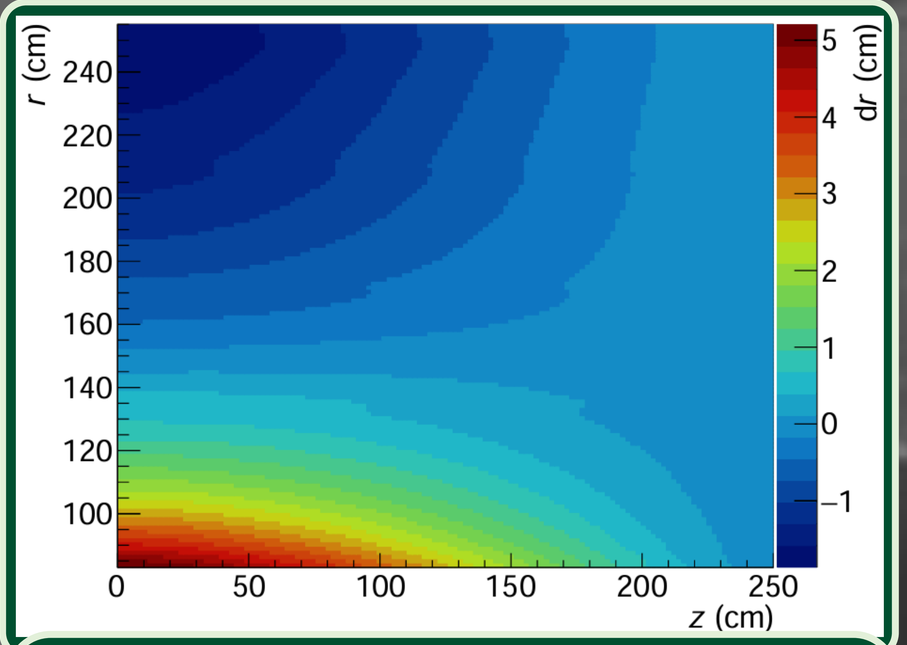


Fig 1. Back flowing ions can create **massive spatial distortions** in gaseous detectors[1]!

Collection Efficiency (CE): The fraction of electrons generated in the drift region which terminate below the grid.

Ion Backflow Fraction (IBF): The fraction of ions that flow back into the drift region relative to the gain.

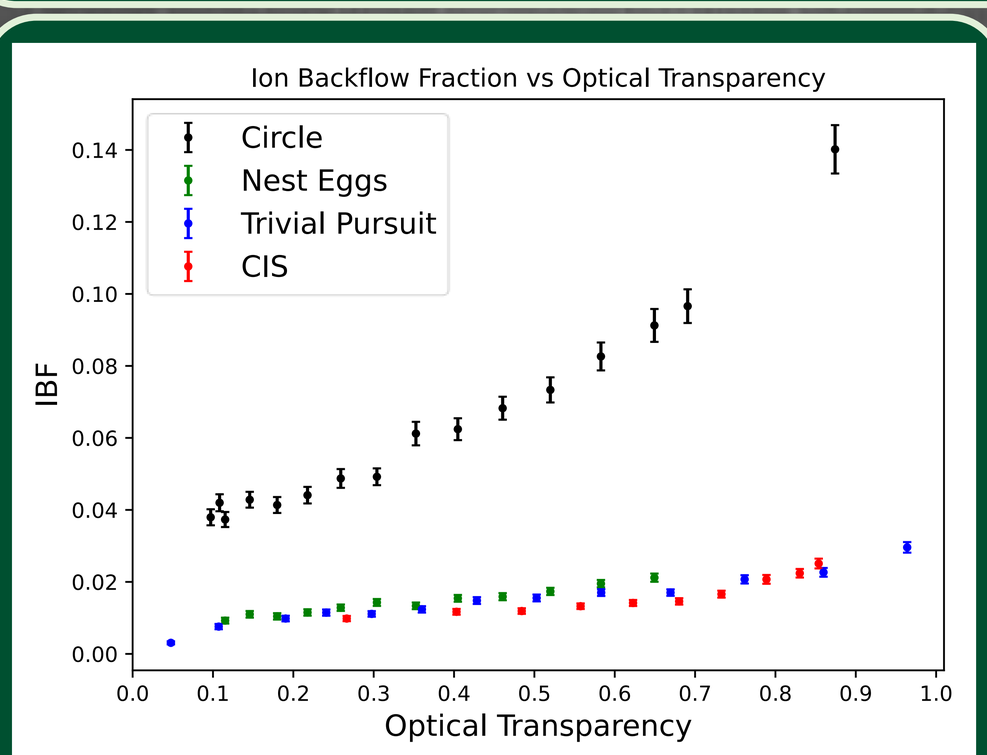


Fig 2. For all optical transparencies, every shape simulated shows remarkable improvement over the circular base case.

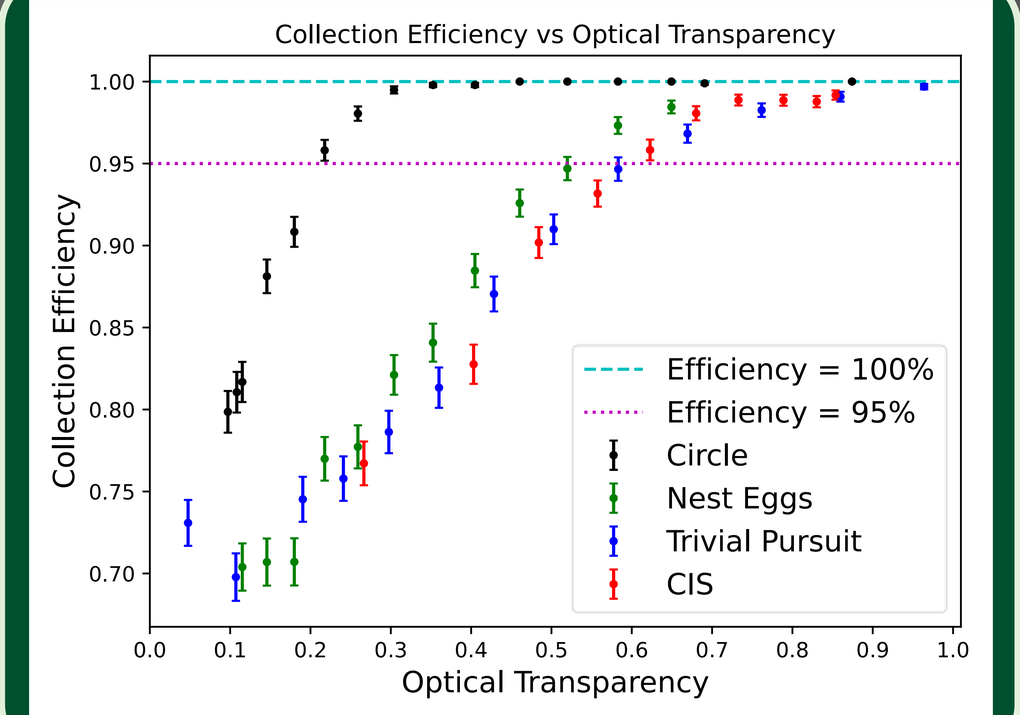
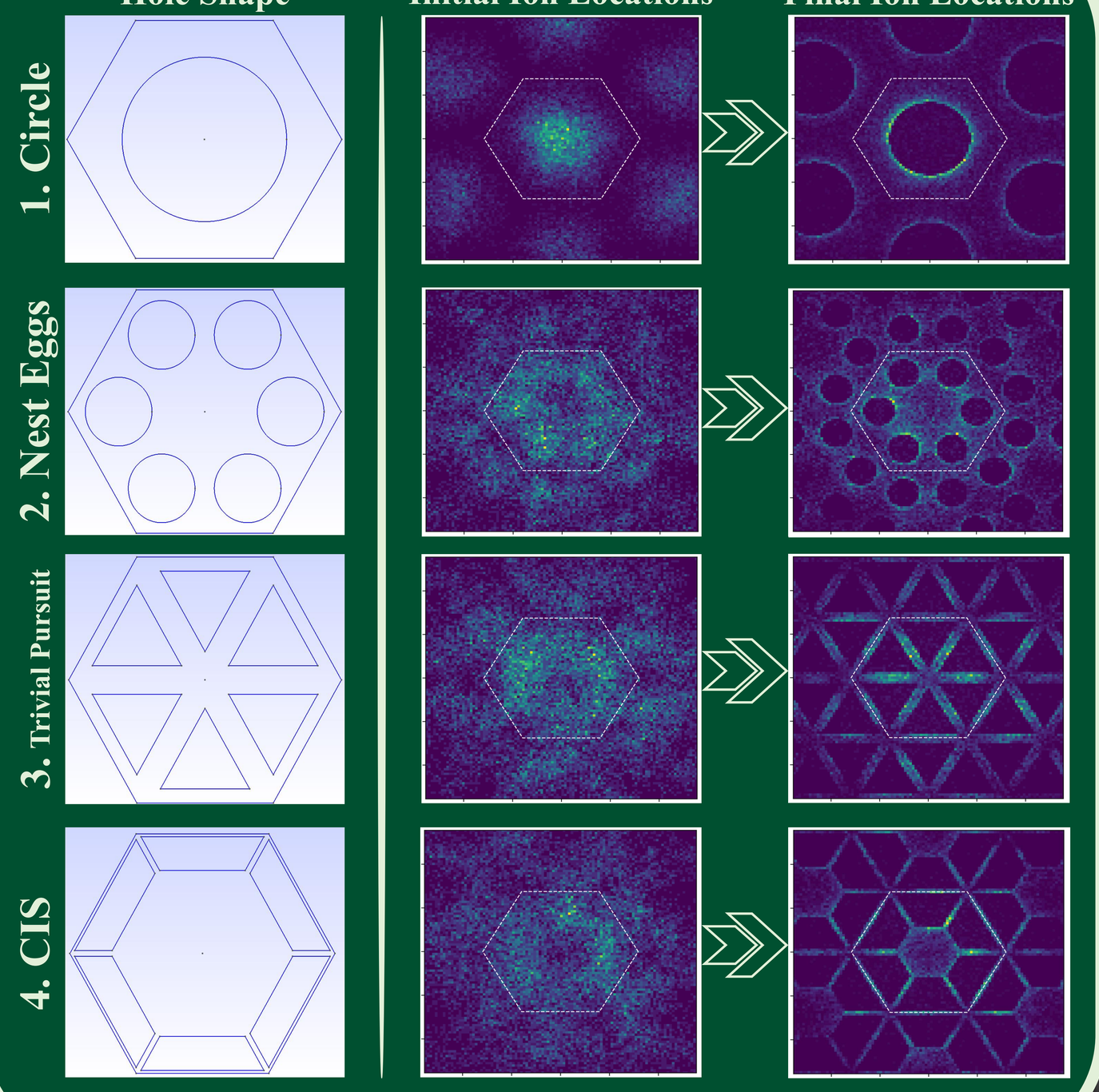


Fig 3. The circular base case has the highest CE, but all shapes are able to surpass 95% CE at higher optical transparencies.

Shape Evolution



1. **We Start with a circle to act as a baseline**
2. **Seeing that the ion distribution is a 2D gaussian, we replace the single circle with a series of offset circles that block the center**
3. **Seeing an improvement in IBF but also a decrease in CE, we update the shapes to triangles in order to widen the parameter space and enable higher optical transparencies**
4. **With high CE achieved, we add a central block to the nested triangles to see if further blocking the center will continue to improve the IBF**

1. Ernst Hellbär, ALICE Collaboration, *Reconstruction in ALICE and calibration of TPC space-charge distortions in Run 3*, JoS, **LHCP2021**, 023 (2021).