



Design of the IER 498 Room Return Shield

Garrett McMath, Chris Romero, Eric
Williamson, Nick Wynne

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The Cumberland Cannon



Image: <https://www.amazon.com/Sluban-M38-B0890-Bricks-M777-Howitzer-Multicolored/dp/B095N76GXY>

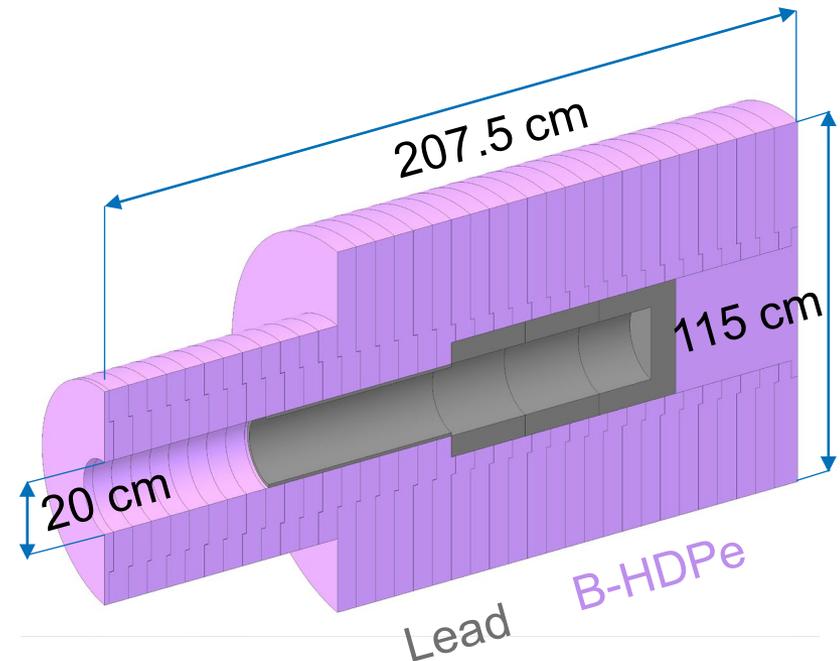
The Cumberland Cannon - Barrel



Image: <https://www.amazon.com/Sluban-M38-B0890-Bricks-M777-Howitzer-Multicolored/dp/B095N76GXY>

The Cumberland Cannon - Barrel

- Complications
 - ~ 2 ton weight
 - Borated HDPE is size limited
 - Machinability limitations (tolerances)
 - Access to foils, shield samples, detectors, etc.
 - Streaming paths
 - Gaps/non-uniformity
- Solutions
 - Lego-like construction to reduce weight of individual pieces
 - Rear loading cartridge
 - Frame will incorporate a press to ensure pieces are in contact and attach to the Flotron carriage



Design by: Chris Romero

The Cumberland Cannon - Carriage

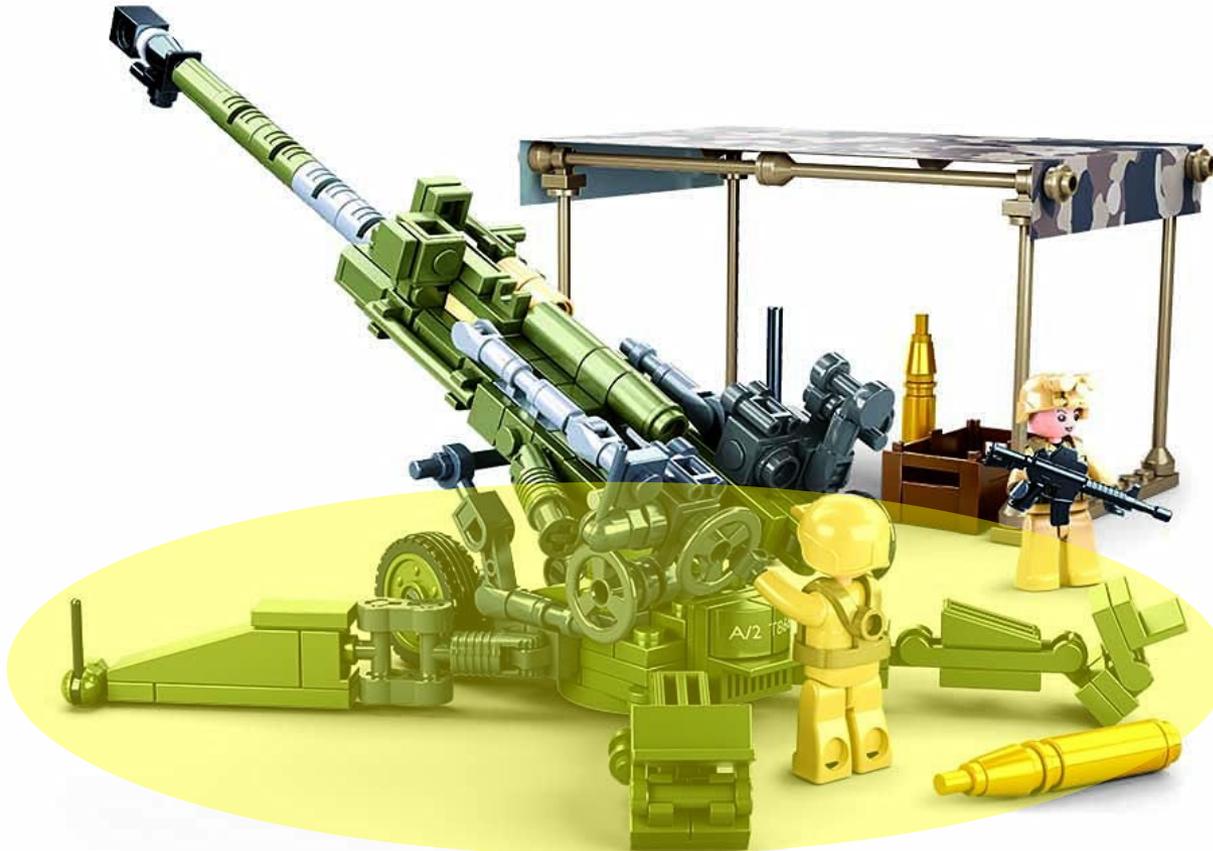
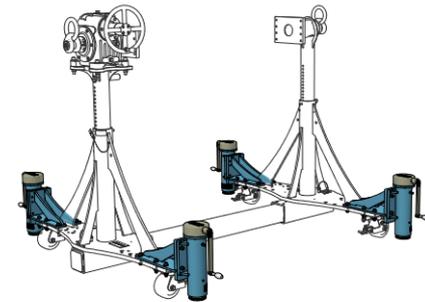


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The Cumberland Cannon - Carriage

- Flotron has COTS options that satisfy the size, load, precision, and angular rotation requirements
- locking casters or leveling jacks available
- Hand crank adjustment with multiple gearbox options for precision angular adjustment and optional indexing plate for reproducibility



Flotron model SFP-862

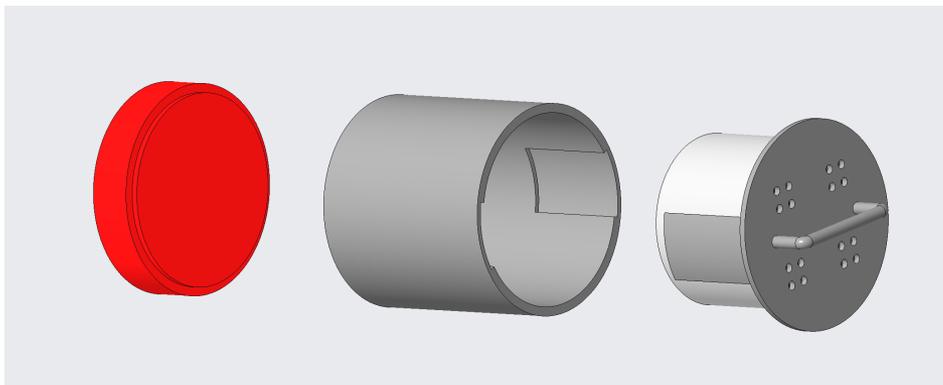
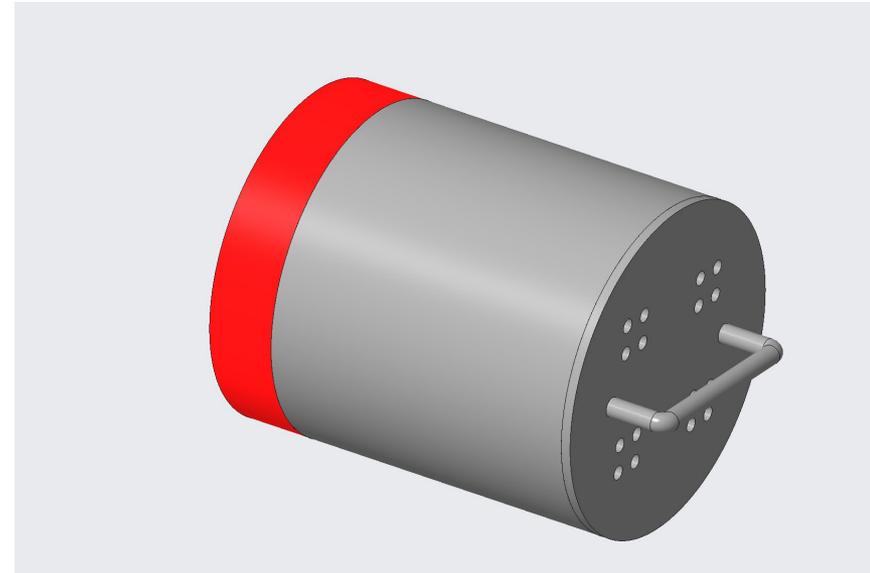
The Cumberland Cannon - Cartridges



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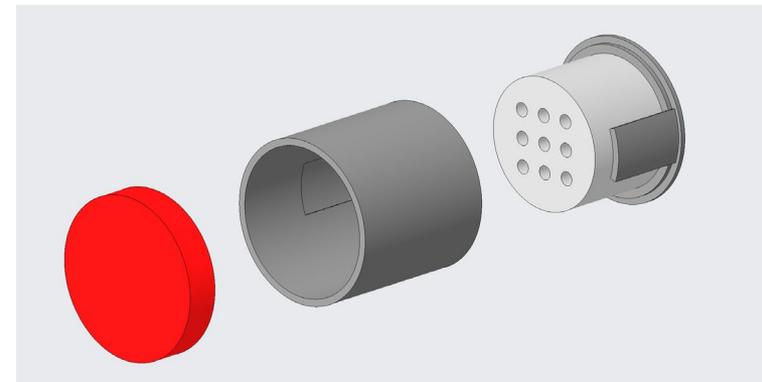
The Cumberland Cannon - Cartridge

- Rear loading
- Allows for detector/foil configuration outside of round room
- Ease of retrieval
 - Dose and foil counting
- Reproducibility



Shielding sample
22 in diameter

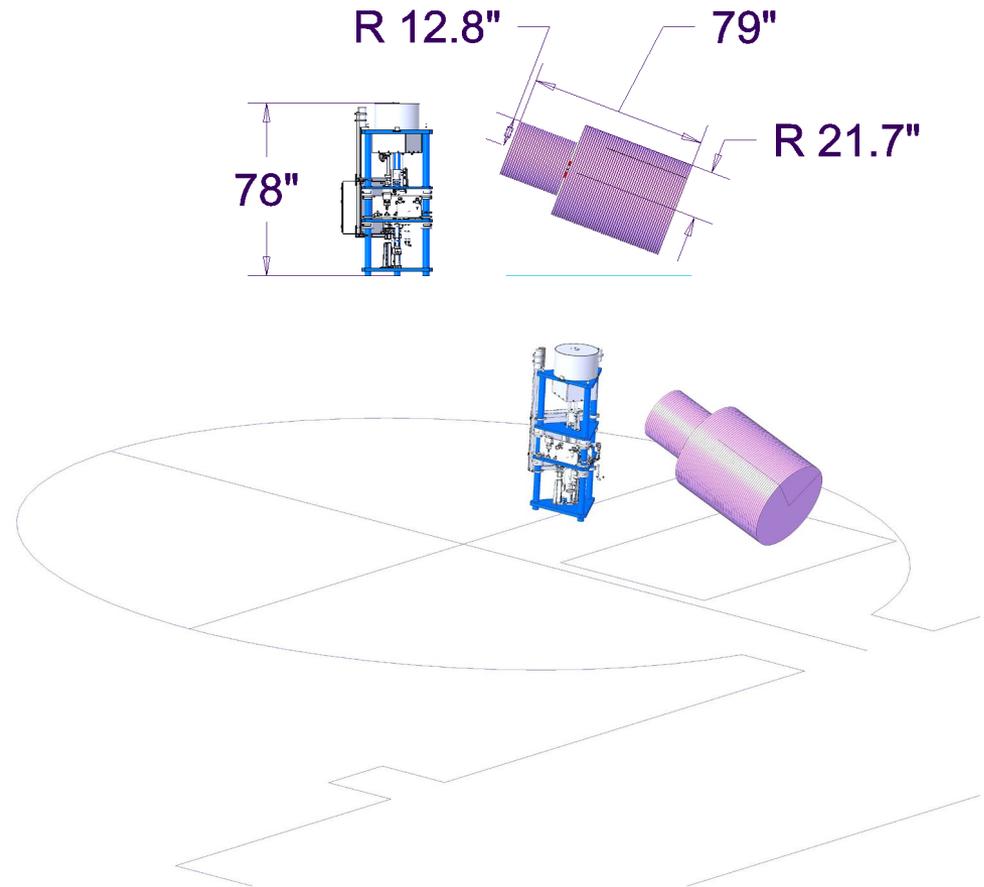
cartridge
~ 25 in length diameter



Design by: Eric Williamson

The Cumberland Cannon – Godiva IV

- Significant footprint in round room
- Room return shield will be assembled outside round room
- Forklift will be used to move the assembled shield to the frame
- Detector/foil cartridges are easily accessible from the ante-room for quick swaps



Design by: Nick Wynne

Future Work

- Finalize designs
- Order equipment and parts
- Finalize selection of foils and detectors
- Determine counting locations and schedule
- Measurement plan and CED 3A

Acknowledgments

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