Lorentz Propulsion Magneto-cyclone for In-Situ Centrifugal Separation of Li/LiH

UP12.00046

Logan Klingler[1], Yufan Xu[2], Francisco Saenz[1], Brian Wynne[1], Egemen Kolemen[1,2]

[1]Princeton University, [2]Princeton Plasma Physics Lab

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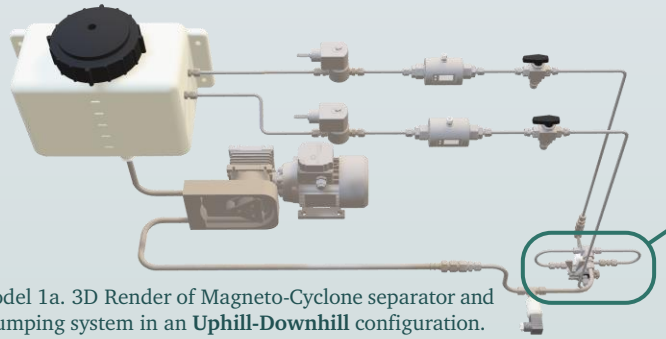


Model 1a. 3D Render of Magneto-Cyclone separator and pumping system in an **Uphill-Downhill** configuration.

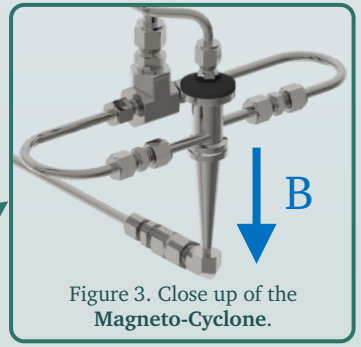
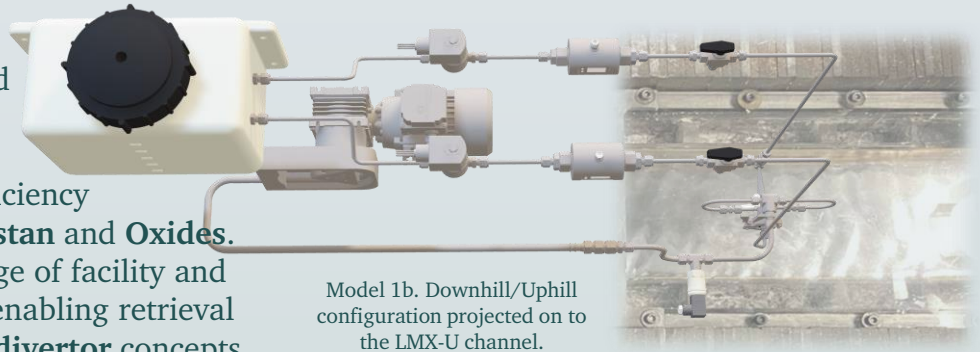


Figure 3. Close up of the **Magneto-Cyclone**.

Purpose of Facility:

- Characterize challenges and advantages of field driven centrifugal separation.
- Measure device-specific efficiency using a proxy mix of **Galinstan** and **Oxides**.
- Transfer practical knowledge of facility and separator design to **LEAP**, enabling retrieval of tritium absorbed by LM **divertor** concepts.



Model 1b. Downhill/Uphill configuration projected on to the LMX-U channel.

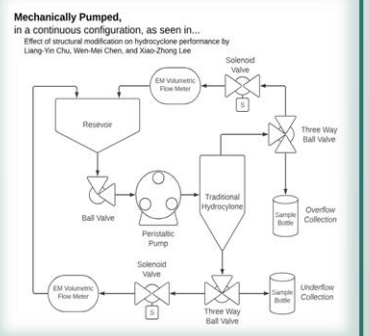


Figure 2. **Uphill-Downhill** system map; continuous pumping.

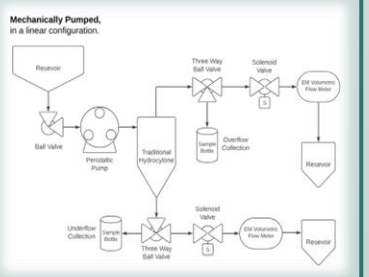


Figure 3. **Downhill** system map, once-through pumping of entire inventory into separate reservoirs.

Research Objectives for 2024/2025:

1. Construct pumping system and proto -type **separator** device
2. Run initial separation experiments
3. Troubleshoot any inadequacies
4. Rebuild and construct **parameterized** parts [5] (cone, vortex finder)
5. Final experiments

Model 2. Cone pitch variations

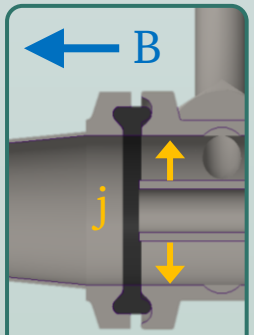


Figure 3. Perpendicular view of cyclone axis.

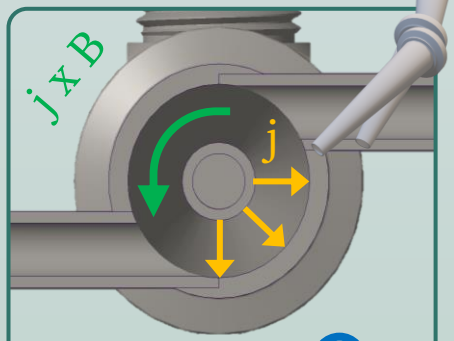


Figure 5. Parallel view of cyclone axis (top-down).

Figure 3. Schematic 2D-representation of the flow field (in a typical hydro-cyclone) [4]

MHD conditions will change from experimental phase to deployment in-situ!

The green/red box is the expected regime our LMX/LEAP systems will operate at. Goal: Balance jxB for cyclonal flows!

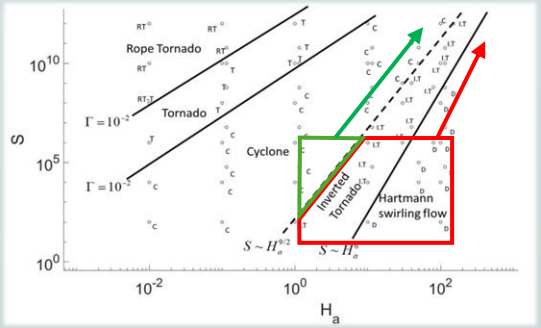


Figure 7. Flow pattern map of swirling flows [2].

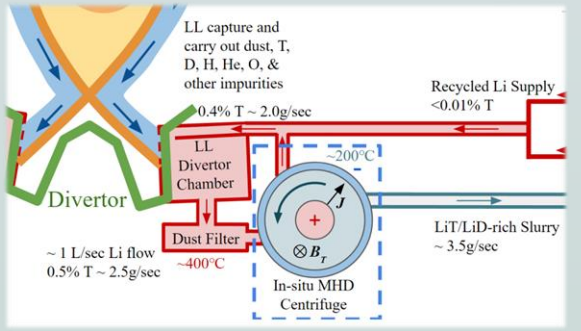


Figure 8. In-situ position of separator device [1].

On Monday: Presentation CP12.-00143 detailed our process for **high-z impurity** detection in Galinstan/HfO2 and Galinstan/WO3 Mixtures using **XRF**.

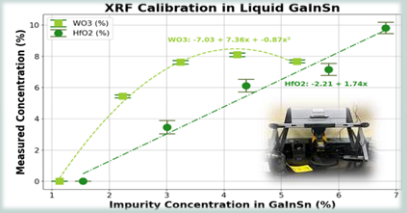


Figure 7. XRF Calibration curves [7].

- To hear more about **LEAP**, go see *UP12.00047!*

References

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Acknowledgements

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