Single path Lithium lens Channel
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- Develop a single path, curved Lithium lens channel model, for
  Phase rotation and
  6D Cooling with Emittance Exchange.
- Compare cooling performance of
  Single path curved Lithium lens,
  Curved Lithium lens Ring, and
  Straight Lithium lens channel.
Schematic Diagram

Proton Beam

Target
Pion capture

Muon
Decay
Channel
Solenoid

Phase rotation
6D Cooling
Lithium lens Channels

- 25 cm Lithium Lens
- 1 cm radius
- RF Gaps
- 1 GHz
Transverse Emittance

\[ \varepsilon_x (\text{mm}^*\text{rad}) \]

\[ \varepsilon_y (\text{mm}^*\text{rad}) \]

- \text{scatt + stragg}
- \text{2 m Circ. Ring}
- \text{straight Li channel}

\[ \text{130 mm}^*\text{mrad} \]

\[ \text{90 mm}^*\text{mrad} \]
Transmossion/Longitudinal Emittance

Transmission

\[ \text{without Decay} \quad 2 \text{ m Circ.} \quad \text{straight Li} \]

\[ \varepsilon_z (\text{mm}) \]

\[ \text{scatt + stragg} \quad \text{2 m Circ.} \quad \text{straight Li} \]
6D Cooling

\[ \varepsilon_{6D} (\text{mm}^3 \text{rad})^3 \]

- 2 m Circ. Ring
- Straight Li channel

\[ 0.3 (\text{mm}^3 \text{rad})^3 \]

\[ z \text{ (m)} \]
Summary

- Cooling performance of a Ring and a Single-path Channel with curved Li lenses are almost the same. Both is different from the cooling performance of the Straight Li channel.
- Improve 6D cooling.
- Simulate target/pion capture, and muon decay channel.