Jet Velocity Analysis

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Muon Collaboration Friday Meeting
1. Distance between fiducial center and center of window is 19 mm.

2. The fiducial length is 10 mm.
Influence of Magnetic Field and Gravity on Jet Trajectory
Global Fitting of Jet Trajectory and Jet Parameters

<table>
<thead>
<tr>
<th>Magnetic field (T)</th>
<th>Nozzle offset (mm)</th>
<th>Nozzle angle (milliradian)</th>
<th>Jet velocity (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 T</td>
<td>-14.5 ± 1.0</td>
<td>33.8 ± 3.8</td>
<td>13.6 ± 0.9</td>
</tr>
<tr>
<td>5 T</td>
<td>-14.5 ± 1.0</td>
<td>33.8 ± 3.8</td>
<td>13.9 ± 0.9</td>
</tr>
<tr>
<td>10 T</td>
<td>-14.5 ± 1.0</td>
<td>33.8 ± 3.8</td>
<td>14.1 ± 1.0</td>
</tr>
<tr>
<td>15 T</td>
<td>-14.5 ± 1.0</td>
<td>33.8 ± 3.8</td>
<td>14.5 ± 1.0</td>
</tr>
<tr>
<td>15 T</td>
<td>-14.5 ± 1.0</td>
<td>33.8 ± 3.8</td>
<td>18.9 ± 2.3</td>
</tr>
</tbody>
</table>

**Designed Nozzle Parameters**

Nozzle Position : -14.4 mm  
Nozzle Angle : 2 degree (35 milliradian)  
Jet Velocity : 15 m/s (20 m/s)
Geometry of Hg Delivery Loop and Head Loss

Jet Velocity after Nozzle Exit
= 13.5 m/s

Jet Velocity before Nozzle Exit
= 15.4 m/s
Pipe Inlet Pressure

Stagnation (Total) Pressure = Dynamic Pressure + Static Pressure

\[ P_{\text{stagnation}} = \frac{1}{2} \rho v^2 + P_{\text{static}} \]
Jet Velocity in Magnetic Fields

- Left graph: Longitudinal jet velocity (m/s) vs. Distance from nozzle (cm)
- Right graph: Logitudinal Hg jet velocity (m/s) vs. Magnetic field (T)
- Symbols represent different magnetic field strengths:
  - Solid square: B=0
  - Red circle: B=5T
  - Blue triangle: B=10T
  - Green inverted triangle: B=15T

- Red circles indicate nozzle velocity.