Introduction to AEgIS experiment

- Reach an accuracy of 1% in the measurement of the matter-antimatter gravitational acceleration.[1]
- Test for CPT violation by S1-S2 transition frequency of the antihydrogen.[1]

Formation of the H⁻ & Working principle of the laser system

- Atom → 2-level system
- Spontaneous emission → F= -βν [2]

Geometry of the Paul trap

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>8E+7</td>
<td>Hz</td>
</tr>
<tr>
<td>V₀</td>
<td>10</td>
<td>V</td>
</tr>
<tr>
<td>r₀</td>
<td>5E-3</td>
<td>m</td>
</tr>
<tr>
<td>L</td>
<td>3E-2</td>
<td>m</td>
</tr>
<tr>
<td>β</td>
<td>E-20</td>
<td>Kg/s</td>
</tr>
</tbody>
</table>

Modification of the simulation code—remove the micro motion of the antiproton

Motion of the antiproton in the Paul trap (with and without the buffer gas)

Without buffer gas

\[ F_{\text{buffer}} = F_{\text{Electric field}} + F_{\text{Coulomb}} + F_{\text{Laser}} \]
\[ F_{\text{p,bar}} = F_{\text{Electric field}} + F_{\text{Coulomb}} \]

Initial Temperature T=4K

With buffer gas

References
