Optical Ion Reflector: Investigating the Elastic Collision Relationship between Ions and the Chamber Walls during Nuclear Fusion in order to Enhance Plasma Density by Focusing a Plasma Beam

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Our experiment seeks to prove the existence of elastic collision reactions occurring between ions emitted from a plasma beam and the target chamber wall. In order to prove this phenomenon, we machined a parabolic indentation of appropriate dimensions unto two conflat flanges. We hypothesized that incoming ions can be recovered from initial dispersion by being reflected (indicating the presence of elastic collisions) towards a narrower return path where incoming ion concentration is highest, thus increasing the number of fusion reaction events. First, we performed a baseline neutron count with the unmodified conflats installed, video-recording and plotting data points from 3-minute time frames every 2 seconds at 30 KV, 35 KV, 40 KV, 45 KV, 50 KV, 55 KV, 60 KV, and 65 KV voltage points. These values were compared against the averaged neutron counts recorded when the modified conflats were installed. We expected our outcome to have a consistent neutron increase difference occurring at each voltage point; instead, our data returned results where neutron counts from the modified conflats exhibited an increasing trend as the voltage increased, due to greater kinetic energy that allows the ions to overcome its electrical attraction to the conflat. This performance trend seems to indicate greater efficiency at higher voltages. Due to our data's consistency and reliability, our hypothesis failed to be rejected.

Awards Won:

Fourth Award of $500