BWP Discussion

John Jayne

Beam Width Probe

Stepper Motor Design

Servo Motor Design

New unit

Old unit

~20 um position resolution
The BWP can be stepped by an externally supplied TTL pulse

**BWP**

- \( C_{AMS} = E_L \times E_S \times E_B \)
  - \( E_L \) = lens ; \( E_S \) = shape; \( E_B \) = bounce
- Designed to provide information on \( E_S \)
- In-situ measurement of particle beam width
- A diagnostic for lens performance
BWP used as a diagnostic

Mexico City 2003
Salcedo et al., 2005
Long AMS chamber 0.4 mm probe(?)

Katrib et al. 2005

BWP measurements of OL/SA particles before and after reaction with O3.

More SA and more O3 reaction = broader beam.

For unreacted particles, the respective three groupings are 100/0, 90/10, and 75/25 OL/SA; 60/40; and 50/50, 30/70, and 10/90.

For reacted particles, the respective three groupings are 100/0 and 90/10; 75/25; 60/40, 50/50, 30/70, and 10/90.

Therefore, the 75/25 and 60/40 OL/SA particles change shape upon chemical reaction.
BWP Status

• 31 units built and delivered.
• How many people have one?
• How many have used it?
  – Have you used it
    • for diagnostics
    • to correct measured mass loadings
    • both
  – Should we continue to build these?

BWP Results

• In most cases the BWP has shown that the beam is well focused and that most particles (mass) passing thru the lens are directed to the vaporizer., eg. $E_b = 1$
Current Calibration and Quantification Issues

*Biggest Issue is the factor of 2 or CE=0.5*

- Particle focusing/divergence?
  - Improved Beam Width Probe
  - Shortened length of chamber by 10 cm

- Particle Bounce?
  - Light scattering probe and BWP results
  - Is there a better design for the vaporizer?
  - Can we directly a “bounce” event?