Picnic Basket Installations and Upgrades

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Outline

- Location of the picnic basket in the experimental area
- Picnic basket configurations:
  - Laser integration for plasma formation
    - E300
    - E301
    - E305
  - Targets: gas jets and solid targets
    - E305
    - E308
    - E332
    - E336
  - Laser/electron beam collisions (SFQED)
    - E320
  - Diagnostics
    - EOS-BPM
    - E324
- Current status of the hardware
- Planned upgrades
Overview of the IP area and location of the picnic basket

The picnic basket is the primary experimental chamber in the beamline
The picnic basket is filled with 7 major assemblies:

1. Lens Mover
   Switches/removes main laser optic
2. EOS-BPM
   Electro-optic sampling beam position monitor
3. M2 Mover
4. SFQED
   E320 experimental apparatus
5. Target Mount
   Switches between different targets
6. Jet View
7. Probe Line
   E324 laser probe

In addition, there is a steering mirror M1.
Laser integration for laser ionized plasma sources

Two optics movers:
• Support up to 2 optics in the compressor with transverse alignment
• Support up to 2 optics in the picnic basket with full 3D alignment
Upstream holed mirror
• Overlap the laser beam with the electron beam
Plus: Steering mirrors and laser diagnostics

Support for two or three optics at a time – all remotely adjustable
Flexible target mount for solid targets and gas jets

- 4 degrees of freedom for solid targets
- Up to 3 different gas jet nozzles

A wide variety of targets and gas jets can be installed simultaneously
Colliding the laser with the electron beam - SFQED

Assembly to focus the laser into the incoming beam
- First OAP focuses the beam
- Second OAP recollimates
- 5D of freedom for both OAPs
- Focus diagnostics setup
- Interferometer for OAP alignment
- Main laser beam dump
Can be removed for compatibility with other experiments

Full remote alignment/optimization of the laser focusing
Chamber provides a variety of diagnostics

- **EOS-BPM** (see Chris’s talk for details)
- Imaging of the targets/jets (front and top)
- High resolution shadowgraphy
- E324 laser probe of the downstream plasmas

Supporting diagnostics for the laser, electron beam, and targets in the chamber
Current status of the hardware installation
Current status of the hardware installation

Detailed design developed with users before installation

Fully installed and commissioned:

- Lens mover
- EOS-BPM
- M2 mover
- Jet view
- Probe line

SFQED

- Facility provided infrastructure for apparatus – all fully installed

Target mount

- Only running with a single gas jet instead of the designed 3
- A single jet has been sufficient – low priority to upgrade

Detailed planning led to a straightforward and quick installation/commissioning
Planned upgrades

One upgrade already installed
• Tip/tilt capability added to the target mount

Several more upgrades in the works
• Tip/tilt measurement for the target mount
• Knife edge mover for the downramp injection

Capabilities added as demanded by user requirements
Summary

The picnic basket can support many experiments simultaneously
  • Demonstrated over the last run, used for E300, E305, E308, E320, E332, E336

Flexible setup allows us to support new experiments as needed
  • Wide range of solid target and gas jets can be supported
  • Flexible optical stages for both target interaction and downstream ionization

Careful planning meant that initially planned hardware is nearly all installed and commissioned

Upgrades installed as demanded by user requirements
  • One upgrade already installed
    - Tip/tilt capability added to the target mount
  • Several more upgrades in the works
    - Tip/tilt measurement for the target mount
    - Knife edge mover for the downramp injection
Questions?