**Experimental Safety & Risk Assessment**

For MBT Particle Forge and Quantum Chip Demonstrations

**1.**

**Laser Safety**

* All lasers must be Class 2 or lower for initial trials.

If higher-power is needed for photon conversion or beam stability, require safety goggles matched to laser wavelength, clear warning labels, and NO direct viewing.

* Beam path must be fully enclosed (tubing, baffles, etc) except at sensor face.
* Access to experiment area restricted during operation.
* Interlock switches on all enclosure doors (auto-power-off if opened).

**2.**

**Vacuum Chamber & Pressure Hazards**

* Use vacuum-rated glass/metal vessel, tested above intended vacuum to avoid catastrophic failure.
* Never evacuate without chamber in a rigid containment shield (acrylic blast shield or equivalent).
* Pump controls and gauges outside shield; chamber never handled while under vacuum.
* Vent slowly after experiment to avoid sudden implosion/explosion risk.

**3.**

**Rotating Hardware**

* Secure all rotating parts within safety housing; never operate with covers removed.
* Start at lowest RPM and increase gradually; monitor for vibration or noise.
* Emergency stop button accessible at all times.
* Balance chamber and check mounting before each run.

**4.**

**Laser/Photon Energy Handling**

* If photon-to-mass conversion is attempted:
  + Contain all output within vacuum chamber—no open/unguarded samples.
  + No flammable materials in the chamber during runs.
  + Radiation dosimeter nearby if any high-power or unknown conversion products involved.

**5.**

**Electrical Safety**

* All high-voltage (laser drivers, motor controllers) must have proper insulation, grounding, and fusing.
* Do not operate if water/condensation present near electronics.

**6.**

**General Protocol**

* All personnel must be briefed on emergency shutdown and egress.
* First aid kit and fire extinguisher in room.
* Document all runs: operator, settings, date, safety checks, anomalies.
* If anything unexpected occurs, stop immediately and review procedure.

NOTE: This assessment is based on standard lab best practices for optics, vacuum, and mechanical systems.

Always consult local institutional/EHS guidance for site-specific rules and further oversight.