

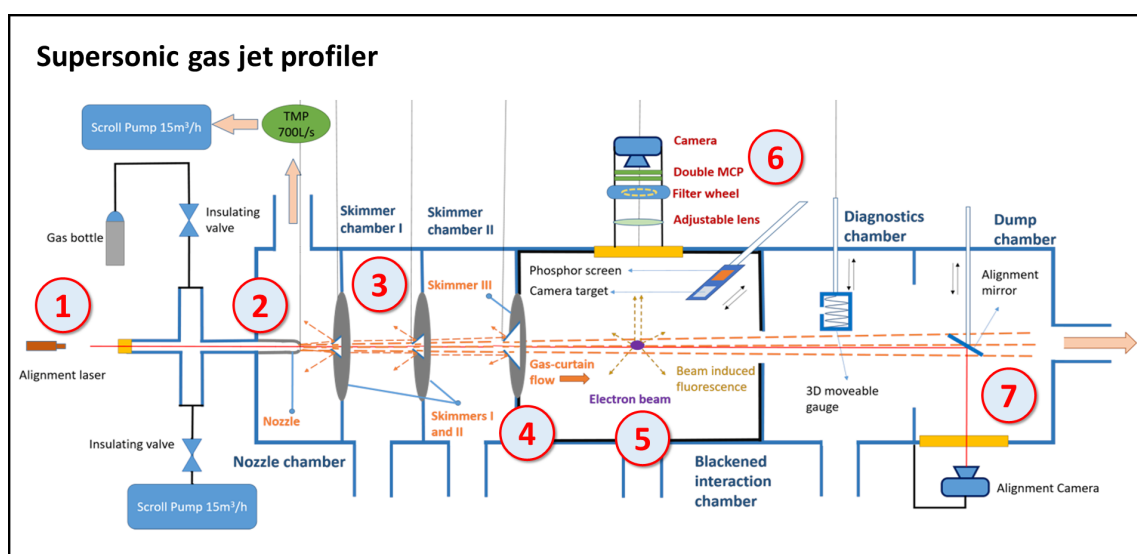
Detailed illustration

A disturbance in the Force gives insights in beam diagnostics

Supersonic gas jet monitor

Nitrogen gas (N_2) was selected because it is neutral and unreactive, so it does not damage the beam or equipment, and it produces strong fluorescence. When the particle beam crosses the gas curtain, it excites the nitrogen electrons, which release photons. These are collected by using a photomultiplier tube and an image is created. Other gas species have been successfully tested.

The diagram below shows the setup of the supersonic gas jet monitor.



Supersonic gas jet profiler
University of Liverpool

1. Alignment laser – makes sure all the components are correctly lined up.
2. Nozzle – Nitrogen gas is released and accelerated to supersonic speeds.
3. Skimmers – these are used to create a dense, uniform flow of gas particles.
4. Rectangular skimmer – shapes the gas into a thin curtain.
5. Interaction – the electron beam passes through the gas curtain and excites electrons, which release photons.
6. Imaging – released photons travel to a phosphor screen; this amplifies their brightness, so they are visible to the imaging camera. The image of the beam is captured.
7. Dump chamber – particles in the gas curtain are collected and removed.