

# MUCOOL Activities at Princeton

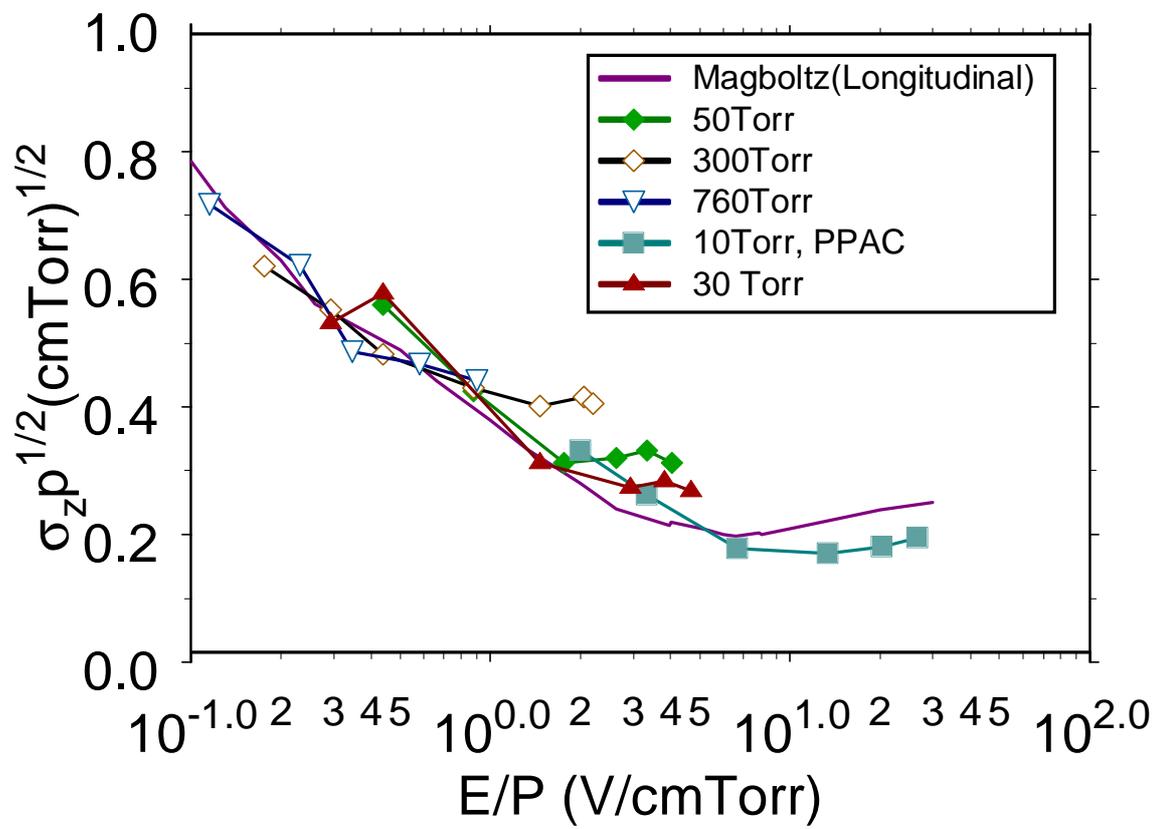
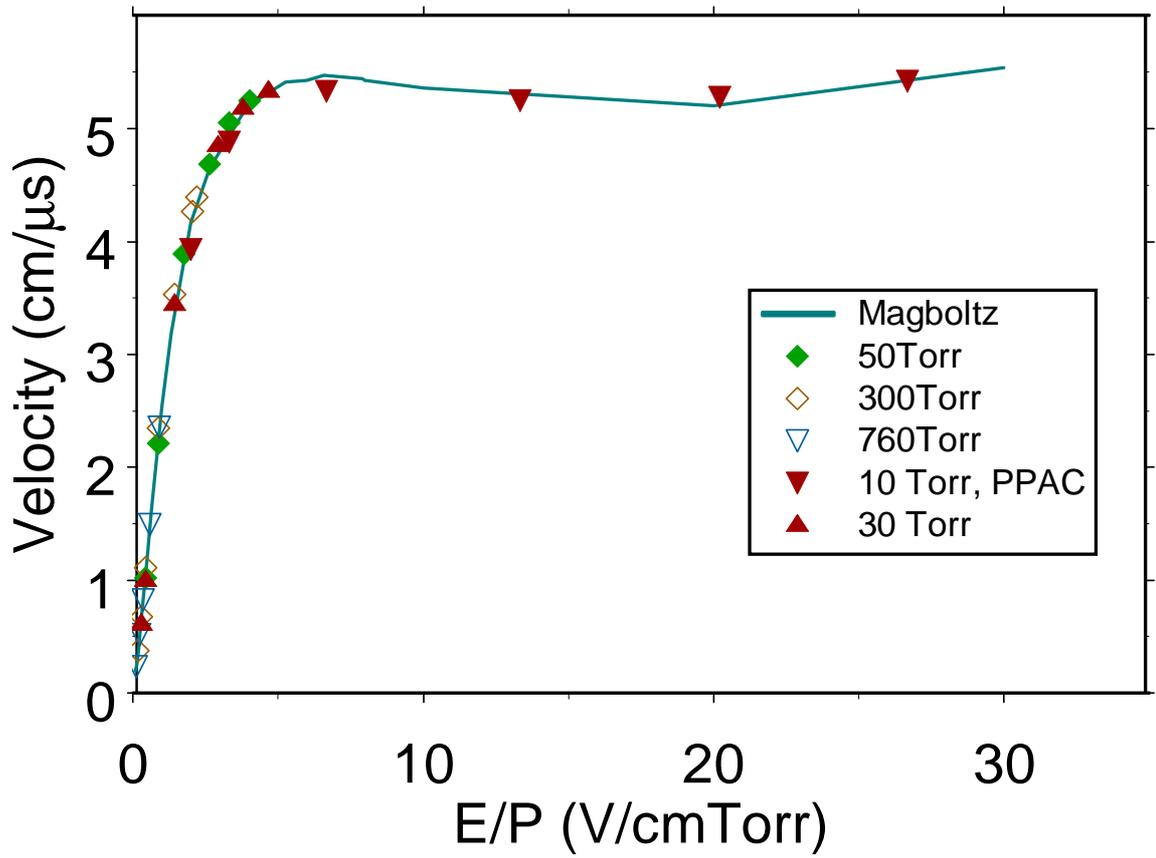
(Nov. 12, 1999)

## Update on Longitudinal Diffusion

Data collected with  $\approx 10$  Torr  $\text{CH}_4$ ,  $\text{C}_2\text{H}_2$  and  $\text{C}_4\text{H}_{10}$  were better than expected from atmospheric-pressure results.

Confirmed by extensive remeasurement.

Agrees with simulation by MagBoltz – a Boltzmann transport code by S.F. Biagi, NIM **A421**, 234 (1999).



## Comments on Cooling R&D Strategy

1. Cooling is critical for a muon collider, and still extremely important for a neutrino factory.
2. The concept of ionization cooling is clear, but its implementation for beams of significant emittance is delicate.
3. The idea of exchange between longitudinal and transverse emittance is clear, but little progress has been made towards a realistic implementation, matched to transverse cooling sections.
4. A viable cooling apparatus will very likely involve technically challenging combinations of high-gradient rf, superconducting magnets, and liquid hydrogen absorbers.
5. In my view (which I believe is also the view of MUTAC and of FNAL management), we have misjudged the magnitude of the conceptual challenges of ionization cooling, and dedicated too much of our resources to anticipated technical challenges.

## Therefore:

- We should give clear priority to understanding the conceptual details of ionization cooling – based on analytic and numerical calculation. **This is R&D!**
- With this shift in priority should come allocation of the Collaboration R&D budget in support of people involved in such studies.
- The enhanced cooling “theory” efforts should continue to be tempered with engineering reality.
- Buildup of engineering infrastructure should take second priority until the technical needs are much clearer.

## Otherwise:

1. We will continue to have no clear idea as to what constitutes a viable cooling apparatus – without which we cannot plan for an effective hardware R&D.
2. We run the risk of being driven by the need to feed existing types of infrastructure rather than by the goal of developing a new technology.