

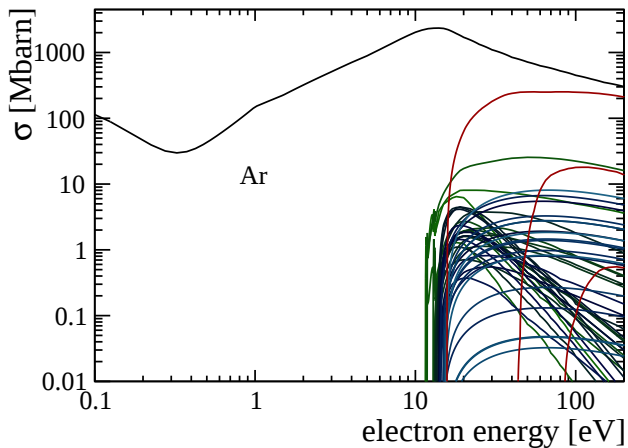
Magboltz ca. 1999

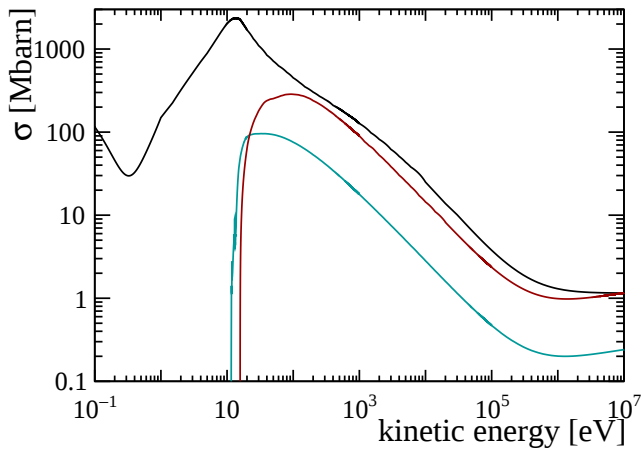
- S. F. Biagi, *Monte Carlo simulation of electron drift and diffusion in counting gases under the influence of electric and magnetic fields*, Nucl. Instr. Meth. A **421** (1999), 234 – 240.
- Cross-sections for 26 gases, mostly isotropic.

Magboltz ca. 2009

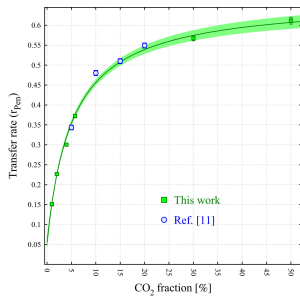
- <https://indico.cern.ch/event/74329/>
- Cross-sections for > 50 gases.
- Improved description of angular distributions.
- Calculation of Townsend coefficients using Steady-State Townsend (SST), Pulsed Townsend (PT) and Time-Of-Flight (TOF) methods.
- First versions of the MIP (later Degrade) “spin-off” program, extending the electron scattering cross-sections to $\sim$ MeV energies.
- Detailed modelling of noble gas excitation levels.

Exciting times...

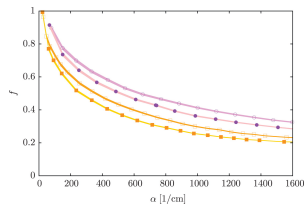




Penning transfer

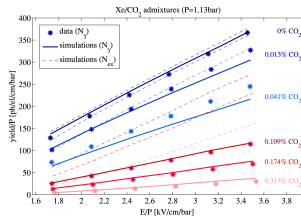
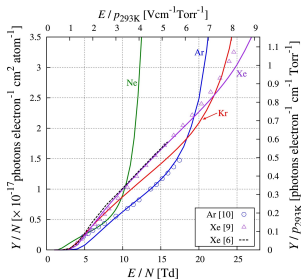


Nucl. Instr. Meth. A **768** (2014), 104 – 111



Nucl. Instr. Meth. A **624** (2010), 78 – 84

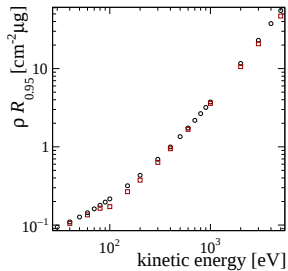
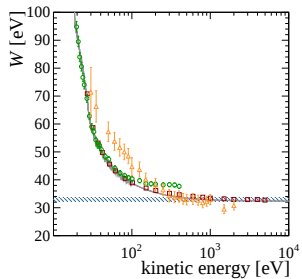
Light emission



Nucl. Instr. Meth. A **877** (2018), 157 – 172

Phys. Lett. B **703** (2011), 217 – 222

Primary ionisation and δ electrons



2015 CF_4 , TMA
2016 C_2H_6 , O_2 , N_2
2017 C_3H_8 , H_2O
2018 CO_2 , NO , NH_3
2019 H_2 , D_2 , CH_3OH , $\text{C}_2\text{H}_5\text{OH}$, $\text{C}_3\text{H}_7\text{OH}$
2020 DME
2021 CO , C_3F_8 , CCl_4
2022 C_2H_4 , SiH_4
2023 C_2F_6 , $\text{C}_2\text{H}_2\text{F}_4$

- Modelling of background gas motion ($T > 0$).
- Dissociative ionisation cross-sections.
- Photon transport (Compton scattering, Rayleigh scattering, pair production, photoabsorption).
- Deexcitation (Auger, fluorescence).
- ...

"I think it was about 2003 to 2005, I was involved with Phil Turner in optimising the strip layout for the VELO. We used a program which has now been taken over by Synopsys. The simulation involved the simulation of the manufacturing process to get things like junction depth, oxide thickness, annealed doping profiles in order to give capacitances and hence signal to noise ratios. We also introduced a 5 level radiation damage model of which two levels were very deep in the band gap (almost at the band gap centre). The two deep levels gave a good simulation of the radiation damage in a hadron beam."

