

# Magboltz update

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# R134a updates in Magboltz

- ▶ Measurements &  $\sigma$  extraction of R134a have finished
  - ▶ Reported in presentation Marnik Metting Van Rijn (ETHZ)
  - ▶ Updates are included in new version Magboltz (11.18) and Degrad (3.18)
  - ▶ Analysis note to be attached at later date (after publication)
- ▶ Small modifications to Magboltz & Degrad Programs
  - ▶ New type of collisions: a subset of excitation collisions with energy loss = incident energy loss –  $kT$  ( $\gamma$  emission with  $E = k_B T$ )
  - ▶ These collisions correspond to vibrational excitations where the total energy is lost and an electron with thermal energy is emitted
  - ▶ Code change is small: 3 extra lines in various “monte” subroutines

```
IF(EI.EQ.AKT) THEN
EI = E-AKT
ENDIF
```

# R134a updates in Degrad

- ▶ Additional update in “MIP subroutine Degrad”
  - ▶ Previously: error in E-field dependence of cluster size distribution at high Electric Field ( $> 50\text{kV/cm}$ )
  - ▶ Necessary for accurate modelling RPC detectors
  - ▶ Now accurate value of cluster size at fields even at  $E > 100\text{kV/cm}$
- ▶ Additionally some small changes to density effect calculation
  - ▶ For  $\beta\gamma > 200$

# R134a updates in Magboltz & Degrad

CERN Consult Writeups Magboltz

## Magboltz - transport of electrons in gas mixtures

**Responsible at CERN:** [Rob Veenhof](#)  
**Manual Type:** Source files, cross sections  
**Versions:** 11.18  
**Author:** [Stephen Biagi](#)  
**Reference:** none

**Created:** 20 May 1995  
**Last Update:** 1 Dec 2023  
**Verified:** 1 Dec 2023  
**Valid until:** further notice  
**Support Level:** [Normal](#)

### Magboltz

Magboltz solves the Boltzmann transport equations for electrons in gas mixtures under the influence of electric and magnetic fields.

Further information:

- [LXCAT](#) cross section compilation;
- How to [use](#) Magboltz

Magboltz source files:

- Source [file](#) for version 11.15 (edition of 11 Jul 2022, [note](#) on C<sub>2</sub>H<sub>4</sub>);
- Source [file](#) for version 11.16 (edition of 28 Jan 2023, [note](#) on SiH<sub>4</sub>);
- Source [file](#) for version 11.17 (edition of 1 Apr 2023, [note](#) on C<sub>2</sub>F<sub>6</sub>);
- Source [file](#) for version 11.18 (edition of 1 Dec 2023).

## Degrad - transport of electrons in gas mixtures

**Responsible at CERN:** [Rob Veenhof](#)  
**Manual Type:** Source files, cross sections  
**Versions:** 3.18  
**Author:** [Stephen Biagi](#)  
**Reference:** none

**Created:** 20 May 1995  
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**Verified:** 1 Dec 2023  
**Valid until:** further notice  
**Support Level:** [Normal](#)

### Degrad

Degrad calculates the cluster size distribution and primary cluster distribution in gas mixtures for minimum ionising particles and X-rays. Please contact Steve Biagi before using this program.

- Source file for [version 3.15](#) (edition of 11 Jul 2022);
- Source file for [version 3.16](#) (edition of 28 Jan 2023);
- Source file for [version 3.17](#) (edition of 1 Apr 2023);
- Source file for [version 3.18](#) (edition of 1 Dec 2023).