

Index

- ¹⁰B-enriched boron trifluoride (BF₃), 71
³He-filled proportional counters, 71
- absolute gain measurement, 188
 absorption coefficient for mixtures, 45
 absorption cross section, 45
 xenon, 47
 photons in tungsten, 46
 saturated hydrocarbons, alcohols, DME, 50
 absorption length, 44–5
 mylar, 67
 aclar transparency, 67
 ageing
 of micro-pattern detectors, 459
 of micro-strip chambers, 457
 of resistive plate chambers, 455
 ALEPH TPC, 298
 ALICE proximity focusing RICH, 423
 ALICE time-of-flight, 357
 ALICE TPC, 299
 argon dimer, 132
 astronomy and polarimetry, 398
 attachment coefficient, 109
 attachment cross sections, 22
 attachment probability, 107
 Auger effect, 58
 avalanche
 angular spread, 238
 charge multiplication, 183
 fluctuations, 149
 multiplication on cathode edges, 373
 statistics, 149
- bakelite, 346
 laminates, 351
 RPC, 347
 bent crystals, 11
 Bethe–Bloch expression, 29
 binding energy, 56
 breakdown mechanisms, 233
- bremsstrahlung, 25
 bubble chamber, 2
 burning organic deposits, 452
- calcium fluoride windows, 400
 carbon tetrafluoride, 315, 453
 carbon vapour deposition, 369
 cathode charge distribution, 237
 cathode induced signals, 234
 cathode strip chambers, 256
 cathode-induced charge, 42
 centre-of-gravity, 236
 CF₄ scintillation, 433
 channelling, 11
 charge induction on conductors, 160
 charge induction through resistive electrodes, 329
 charge multiplication factor, 146
 charge multiplication process, 21
 charge pre-amplifier, 383
 Charpaktron, 15
 Cherenkov angle, 403
 Cherenkov effect, 54
 Cherenkov photon emission, 25
 Cherenkov ring imaging, 13–14
 choice of the gas filling, 191
 CLEO III LiF-TEA ring imaging, 410
 cloud chamber, 2
 cluster counting, 34
 cluster size, 34
 collision probability, 24
 collisional charge transfer, 85
 COMPASS RICH, 386, 423
 COMPASS spectrometer, 18
 composite materials, 28
 compteur à trous, 377
 Compton scattering, 62
 converters for hard photons detection, 63
 CsI photocathodes, 420
 CsI-coated multi-GEM, 428
 current division, 284

- cylindrical GEM electrode, 385
cylindrical proportional counter, 182
cylindrical triple-GEM, 390
- declustering, 312
de-excitation, 129
delay line, 245
DELPHI barrel RICH, 417
DELPHI TPC, 299
delta electrons, 25, 29, 31
delta electrons statistics, 40
deposits on electrodes, 441
detector efficiency, 27
deterioration under irradiation, 252
differential Cherenkov counters, 399
differential energy loss, 29
diffusion coefficient, 81
diffusion reduction in magnetic field, 294
dimethyl ether, 50
discharge probability, 372
discharges and breakdown, 231
double Compton scattering, 62
drift and diffusion, 76
drift chamber, 8, 79
 at high pressures, 266
 construction, 290
drift tubes, 77, 275, 329
drift velocity, 82
 of ions and electrons, 21
dual-phase detectors, 440
- E605 RICH particle identification, 15, 411
electrodeless drift chambers, 287
electromagnetic interactions, 24
electron attachment, 89
electron backscattering cross sections, 421
electron capture, 106
 losses, 128
electron counting method with optical detection, 201
electron drift
 in liquid argon and xenon, 113
 in liquid noble gases, 112
 in magnetic fields, 90
electron drift velocity, 90
 in carbon tetrafluoride, 98
 in dimethyl ether, 98
electro-negative addition, 229
electro-negative gases, 193
electronic excitation, 130
electron–molecule collision cross sections, 117
emission spectra for argon–methane, 138
emission spectra of carbon tetra-fluoride, 140
energy loss, 25
energy loss distribution, 32
energy resolution of proportional counters, 195
energy transfer, 24
epithermal and thermal neutrons, 70
- escape peak, 60
European Hybrid Spectrometer, 292
E×B distortion, 310
excitation and ionization, 24
excitation levels, 129
- Fano factor, 61
fast amplifiers-discriminators, 358
Fermi plateau, 25
figure of merit, 403
first Townsend coefficient, 144
fluorescence, 43
 emission, 139
 yield, 58
fluorine creation in avalanches, 455
Frisch grid ionization chamber, 176
Furry statistics, 195
Furry’s law, 150
fused silica windows, 401
- gain reduction due to space charge, 204
gas electron multiplier, 17
gaseous photomultipliers, 398
Gauss identity, 165
Gaussian diffusion law, 81
Gaussian statistics, 32
Geiger, 1
Geiger operation, 206, 230
Geiger–Müller counters, 1
Geiger–Müller process, 206
GEM, 383
GEM CsI RICH, 426
GEM time resolution, 389
glass RPCs, 353
golden rule of induced signal formation, 160
Green’s reciprocity theorem, 165
grid transparency, 175
GridPix, 397
guard rings, 184
- hadron therapy, 433
hadron-blind detector (HBD), 428
hadrontherapy, 12, 19
HEED, 34
hexagonal drift chambers, 274
high-accuracy drift chambers, 271
high-density drift chambers, 64
hydrocarbon polymers, 441
hydrofluoridric acid, 459
- ICARUS experiment, 324
imaging chamber, 15, 279
induced charge for extended tracks, 163
induced charge profile, 170
InGrid, 397
internal solid converters, 71
ion mobility, 83
ionization coefficients, 147

496

ionization cross section, 144
 ionization minimum, 26
 ions drift velocity, 82

JET chambers, 280

Landau expression, 31
 Landau fluctuations, 61
 largest CaF₂ windows, 409
 limited streamer, 230
 limited streamer tubes, 327
 linear absorption coefficient, 44
 linseed oil, 350
 linseed oil polymerization, 456
 liquid noble gas TPC, 324
 localization accuracy, 239
 longitudinal diffusion, 98
 of charges, 80
 longitudinal localization by current division, 287
 Lorentz angles, 106
 low resistivity glass, 355
 luminescence yield, 133
 LUX dark matter detector, 436

MAGBOLTZ program, 153
 magic gas, 226
 magnetic drift velocities, 106
 magnetostrictive readout method, 3
 Malter effect, 233, 444
 mass absorption coefficient, 45
 Maxwell–Boltzmann law, 80
 mean collision time, 91
 mean free path for absorption, 58
 Medipix, 397
 Melamine, 346
 micro-discharges, 450
 micro-gap chamber, 374
 micro-groove chamber, 374
 Micromegas discharge probability, 382
 Micromegas ion feedback, 393
 micro-pattern-based TPC readouts, 301
 micro-pin array, 375
 micro-pixel chamber, 375
 micro-strip gas counter, 16
 micro-wire chamber, 374
 mobility of nitrogen ions, 85
 molar extinction coefficient, 45
 molecular dissociation, 130
 monitored drift tubes, 330
 Mont Blanc experiment, 328
 MPPGD applications, 398
 MSGC two-track resolution, 367
 multi-cell planar drift chambers, 265
 multi-gap RPCs, 355
 multiple Coulomb interactions, 28
 multiplication factor, 186
 multi-step chamber, 246
 multi-tube arrays, 327

Index

multi-wire proportional chamber (MWPC), 5, 64, 211
 muon detectors, 351
 muon spectrometers, 330
 MWPC
 critical wire length, 219
 detection efficiency, 225
 electric field, 212
 energy resolution, 228
 gain variations, 216
 proportional or semi-proportional operation, 222
 wire capacitance, 214

NA49 TPC, 309
 negative ions TPC, 325
 Nernst–Townsend formula, 83
 neutron cross sections, 70
 neutron interactions, 68
 neutron moderation, 69
 non-polymerizing additives, 442
 non-polymerizing quenchers, 445
 nuclear scattering radiography, 11

optical imaging chamber, 15, 432

P10 mixture, 192
 pad response function, 301
 parallel plate avalanche counters, 177
 particle identification, 32
 Penning condition, 197
 Penning effect, 145
 Penning mixtures, 197, 199
 Pestov glass, 345
 phenolic polymer laminates, 346
 photo-absorption ionization model, 33
 photoelectric absorption, 56
 photo-ionization threshold, 400
 photolithographic processing, 367
 photolithographic technologies, 365
 photon absorption, 44
 photon absorption and emission in gases, 43
 photon absorption cross section, 44
 for carbon tetrafluoride and nitrogen, 53
 for water, 50
 for oxygen, ozone, 50
 in gaseous fluorinated carbon compounds, 53
 photon conversion efficiency of GEM detectors, 65
 photon emission, 133
 photon emission by avalanches, 136
 photosensitive vapour, 399
 plastic streamer tubes, 328
 plastic tubing, 451
 Poisson statistics, 26
 Polya distribution, 152
 polyimide windows, 67
 polymerization processes, 445
 portal imaging, 398
 position-sensitive neutron detectors, 73
 positive ions backflow, 318

- positive ions density, 319
- positive space, 249
- positron emission tomography, 64
- preamplification, 246
- preamplification and transfer, 249
- primary and total ion pairs, 26
- primary and total ionisation, 20
- proportional counter, 1
- pulsed laser beams, 323

- radiation damage, 441
- radiation-induced damages, 443
- radiative de-excitation, 132
- radio-chromatography, 12, 432
- Raether limit, 16, 155, 231, 372, 389
- Ramo theorem, 161, 364
- Ramsauer minimum, 118
- rate capability, 204
- rate effects, 249
- RD28 collaboration, 369
- relativistic rise, 25
- resistive plate chambers (RPC), 65
- resistive plate counters, 346
- resonance frequency, 262
- right–left ambiguity, 273
- ring imaging Cherenkov counters, 54
- Rose and Korff expression, 186
- RPC signals induced, 352
- Rutherford, 1
- Rutherford expression, 28

- saturated avalanche mode, 348
- saturated avalanche regime, 347
- scintillation counters, 199
- scintillation from liquid noble gases, 142
- scintillation proportional counters, 198
- scintillation spectra of argon, krypton and xenon, 134
- secondary photon emission, 133
- self-quenching streamer 207
 - operation, 206
- self-supporting MWPC, 254
- signal development in proportional counters, 188
- signals induced by the avalanche process, 172
- signals induced in uniform fields, 161
- silicone polymers, 446
- single photon emission tomography (SPECT), 63
- space-charge gain shifts, 201
- space–time correlations, 290
- spark chamber, 2
- STAR experiment at RHIC, 424
- STAR TPC, 299
- stopping power, 25
- straw tubes, 335
- straws, 329

- straw length as a function of humidity, 343
- streamer chambers, 3
- streamer formation, 153
- streamer propagation, 207
- support lines, 257

- TEA-operated RICH, 405
- temperature dependence of drift velocity, 95
- tetrakis dimethyl amino ethylene (TMAE), 54, 400, 411
- time projection chamber, 292
- thick GEM, 385
- thin-film ^{10}B , ^6Li and ^6LiF coatings, 71
- time expansion chamber, 34, 97, 282
- time projection chamber, 244
- time projection TPC-RICH, 413
- Timepix, 397
- TMAE, 54, 400, 411
- total number of ion pairs, 28
- total specific ionization, 26
- TPC
 - choice of the gas filling, 312
 - calibrations, 323
 - gating grid, 320
 - multi-track separation, 316
 - space resolution, 310
- TPC-based experiments, 297
- transition radiation tracker, 337
- transparency of window materials, 67
- transport theory, 114
- transverse diffusion, 99
- transverse diffusion of charges, 80
- triethyl amine (TEA), 54, 400, 407
- triple-GEM, 387
- triton, 70
- TRUMF TPC, 297
- two-dimensional multi-wire chambers, 235

- velocity distribution for molecules, 82
- vertical drift chamber, 267
- volume multi-wire drift chambers, 275

- water addition, 451
- wavelength shifter (WLS), 430
- weaving machines, 258
- winding machines, 258
- wire chamber construction, 252
- wire displacement, 217
- wire proportional counters, 183
- wire zapping, 452

- XENON dual phase detectors, 436
- X-ray absorption, 56
- X-ray polarimeter, 395