

List of Tables

1	$R \cdot \Delta\Omega_L$ for CH ₄ Experiments	50
2	$R \cdot \Delta\Omega_L$ for C ₆₀ Experiments	50
3	The Parameters of the Molière Potential Function	51
4	The De Broglie Wavelength of the Beam Atoms	51
5	Results of the Fitting	51
6	Integration of Electron Density Distribution	52

List of Figures

1	Schematics of Collision Experiments	53
2	Aim of Study	54
3	Colutron Ion Source	55
4	Experimental Setup	56
5	Supersonic Molecular Beam Source	57
6	Effusive Molecular Beam Source	58
7	Setting of Threshold	59
8	TOF Spectrum of Detector Angle at $\theta_L = 20^\circ$	60
9	TOF Spectrum of Detector Angle at $\theta_L = 50^\circ$	61
10	Results of Kinematical Calculation	62
11	CM Angle as a Function of Laboratory Angle	63
12	Recoil Energy of a Carbon with Ne at 3.2 keV	64
13	Recoil Energy of a Carbon with Ar at 4.2 keV	65
14	Recoil Energy of a Carbon with Xe at 9.8 keV	66
15	FWHM of The TOF Peaks for $\text{Xe}^+ (9.8 \text{ keV}) + \text{C}_{60}$	67
16	Double Slit of Detector	68
17	Peeping Region of Detector for CH_4 Experiments	69
18	Peeping Region of Detector for C_{60} Experiments	70
19	View of C_{60} Molecule	71
20	Molière's Thomas-Fermi Screening Function	72
21	Applicable Range of Molière Potential	73
22	Distance of Closest Approach	74
23	Angular Distribution of Scattered He with C in CH_4 Target	75
24	Angular Distribution of Scattered He with C in C_{60} Target	76
25	Differential Cross Sections of CH_4 Experiments	77
26	Differential Cross Sections of CH_4 Experiments at Several Energies	78
27	Differential Cross Sections of C_{60} Experiments	79
28	Differential Cross Sections of C_{60} Experiments at Several Energies	80

29	Suppression Rate as a Function of Recoil Energy	81
30	TOF Spectra of Measurements and MD Simulations	82
31	Results of Molecular Dynamics Simulation	83
32	Comparison with TOF Spectra of Ar Incident	84
33	Free Parameter Optimization	85
34	Results of Free Parameter Fitting	86
35	Result of Fitting to Ar Measurements	87
36	Results of Fitting to Ne and Xe Measurements	88
37	Z_1 Dependence of a_2 Parameters	89
38	Z_1 Dependence of a_3 Parameters	90
39	Potential Curves between Ne and C	91
40	Potential Curves between Ar and C	92
41	Potential Curves between Xe and C	93
42	Potential Scaling	94
43	Electron Density Distribution of Reduced Charge Z_{eff} Atom	95
44	The Ratio of the Experimental Electron Density to the Molière:	96
45	Average Electron Velocity in Thomas-Fermi Model	97