

Contents

Invited Papers

B. C. Fawcett: Role of highly-charged ions in astrophysical and laboratory plasmas	1
G. Soff: Theory of highly-ionized few-electron systems.....	7
R. W. Dunford, H. G. Berry, D. A. Church, T. P. Dinneen, M. Hass, C. J. Liu, N. Berrah-Mansour, R. C. Pardo, M. L. A. Raphaelian, L. Young, B. J. Zabransky, L. J. Curtis: Precision spectroscopic measurements in few-electron ions	13
H. P. Summers, P. Thomas, R. Giannella, M. von Hellermann, W. Dickson, K. Lawson, W. Mandl, P. Briden, and members of Experimental Division II, JET: Atomic spectroscopy in highly ionised plasmas	17
M. S. Pindzola, N. R. Badnell, D. L. Moores, D. C. Griffin: Electron scattering theory for highly charged ions.....	23
L. H. Andersen: Dielectronic and radiative recombination with highly charged ions.....	29
E. K. Wählín, J. S. Thompson, G. H. Dunn, R. A. Phaneuf, D. C. Gregory, A. C. H. Smith: Electron-impact excitation of multiply-charged ions using energy loss in merged beams: $e + Si^{3+} (3s^2 S_{1/2}) \rightarrow e + Si^{3+} (3p^2 P_{1/2,3/2})$	35
A. Müller: Electron impact ionization of multiply charged ions	39
S. Datz, P. F. Dittner, J. Gomez del Campo, H. F. Krause, T. M. Rosseel, C. R. Vane: Electron ion interactions in crystal channels: collisions in ultra-dense electron media	45
A. Warczak: Electron-electron interactions in fast ion-atom collisions	51
R. Dörner, J. Ullrich, O. Jagutzki, S. Lencinas, H. Schmidt-Böcking, R. E. Olson: Dynamics of recoil-ion production	57
M. Horbatsch: Theory of multiple ionization and capture in energetic ion-atom collisions	63
A. Wolf, J. Berger, M. Bock, D. Habs, B. Hochadel, G. Kilgus, G. Neureither, U. Schramm, D. Schwalm, E. Szemola, A. Müller, M. Wagner, R. Schuch: Experiments with highly-charged ions in the storage ring TSR	69
K. Taulbjerg: Status of the theory of electron capture in ion-atom collisions at low and intermediate energies.....	77
R. Hoekstra, F. J. de Heer, R. Morgenstern: Photons shedding light on basic charge exchange processes.....	81

<i>J.E. Hansen, H. van der Hart, M. Landtman, Y.-T. Shen, N. Vaeck:</i>	
Calculations for doubly-excited states populated in two-electron processes.....	87
<i>P.Roncin, H.Laurent, L.Guillemot, M.N.Gaboriaud, M.Barat:</i>	
Two electron processes in charge exchange reactions involving multiply charged ions.....	93
<i>H.Cederquist:</i>	
Radiative stabilization following transfer of two electrons to Xe^{q+} ($q \leq 35$) in slow collisions with He and Xe.....	99
<i>D.H.H.Hoffmann, K.-G.Dietrich, W.Laux, E.Boggasch, K.Mahrt-Olt, H.Wahl, A.A.Golubev, V.P.Dubenkov:</i>	
Interaction of heavy ions with hot ionized matter	105
<i>M.P.Stöckli:</i>	
The status of the electron beam ion sources	111
<i>R.Geller:</i>	
ECRIS: the electron cyclotron resonance ion sources – (status)	117
<i>J.P.Briand, L.de Billy, P.Charles, J.P.Desclaux, P.Briand, R.Geller, S.Bliman, C.Ristori:</i>	
Study of the interaction of very slow hollow atoms with a solid	123
<i>E.S.Parilis:</i>	
New trends in ion-surface interactions.....	127
<i>H.Winter:</i>	
What ions experience on their way into a metal surface.....	129
<i>H.J.Andrä, A.Simionovici, T.Lamy, A.Brenac, G.Lamboley, J.J.Bonnet, A.Fleury, M.Bonnefoy, M.Chassevent, S.Andriamonje, A.Pesnelle:</i>	
X-ray- and Auger-spectra from multi charged ions interacting with surfaces and solids	135
<i>D.A.Knapp:</i>	
Dielectronic recombination measurements at EBIT	143

Contributed Papers

<i>W.L.Wiese, J.R.Fuhr, W.C.Martin, A.Musgrove, J.Sugar:</i>	
Spectroscopic data tables for highly ionized atoms	147
<i>U.I.Safranova:</i>	
Satellite spectra for highly-charged H-like ions	149
<i>I.A.Ivanov, U.I.Safranova:</i>	
Autoionization states $1s2l4l'$ -energy and autoionization rates	151
<i>I.Reiche, G.Zschornack:</i>	
X-ray emission rates from MCDF wave functions including electron exchange corrections	153
<i>S.Fritzsche, G.Zschornack:</i>	
Effects of final-state interactions of the L-MM Auger spectra of krypton	155
<i>L.P.Presnyakov, A.P.Shevchenko, D.B.Uskov:</i>	
Soft x-ray spectroscopy of high-Z ions in a cool and dense plasma	157
<i>M.Cornille, J.Dubau, M.Loulergue, F.Bely-Dubau, P.Faucher:</i>	
Theoretical analysis of iron X-ray spectra observed in solar active region.....	159

<i>S. V. Bobashev, N. N. Salashchenko, L. A. Shmaenok:</i>	Absolute radiometry technique for VUV and SXR radiation fluxes	161
<i>G. J. Frieling, R. Hoekstra, R. Morgenstern, F. J. de Heer:</i>	He ²⁺ -H collisions: experimental charge exchange cross sections and their relevance for alpha particle diagnostics at JET.....	163
<i>V. B. Kutner, Yu. A. Bykovski, V. P. Gusev, Yu. P. Kozyrev, V. D. Peklenkov:</i>	The laser ion source of multiply charged ions.....	165
<i>E. Unterreiter, F. Aumayr, H. Winter:</i>	Multicharged ion-atom collisions – application for Tokamak edge plasma physics.....	167
<i>G. Ribitzki, A. Ulrich, B. Busch, W. Krötz, R. Miller, J. Wieser:</i>	Heavy ion beam excitation of rare gases	169
<i>A. Förster, T. Kahlbaum, A. Rickert:</i>	Mean ionization state and composition of a dense high-Z plasma.....	171
<i>W. Faust, C. Hahn, M. Rückert, H. Schneider, A. Singe, I. Tobehn:</i>	Electron and positron impact experiments on metallic foils at the Giessen positron source TEPOS.....	175
<i>R. Jertz, G. Bollen, H.-J. Kluge, L. Schweikhard, H. Stolzenberg, I. Bergström, C. Carlberg, R. Schuch:</i>	Highly charged ions in a penning trap: mass measurements, etc.....	179
<i>G. von Oppen:</i>	Parity violation in two-electron systems.....	181
<i>K. Momberger, N. Grün, W. Scheid:</i>	Coupled channel analysis of electron-positron pair production in relativistic heavy ion collisions	183
<i>M. Klapisch, P. Duffy, W. H. Goldstein:</i>	A Monte Carlo model of complex spectra for opacity calculations	185
<i>D. L. Moores, M. S. Pindzola:</i>	Relativistic calculations of inelastic scattering of electrons by highly-charged ions	187
<i>G. Hofmann, A. Müller, B. Weißbecker, M. Stenke, K. Tinschert, E. Salzborn:</i>	Resonances in the electron-impact single and multiple ionization of ions	189
<i>D. Vogel, P. Beiersdorfer, R. Marrs, K. Wong, R. Zasadzinski:</i>	Inner-shell ionization of lithium-like chromium ions.....	193
<i>K. L. Wong, P. Beiersdorfer, D. Vogel, R. Marrs, M. Levine:</i>	Electron impact ionization cross section measurement of lithium-like Ba	197
<i>R. W. O'Neill, I. G. Hughes, I. D. Williams:</i>	A new technique for excitation studies in electron-ion collisions	201
<i>B. A. Huber, Ch. Ristori, H. J. Andrä, P. A. Hervieux, M. Maurel, C. Guet:</i>	Excitation of multiply charged ions by electron impact.....	203
<i>S. Schennach, A. Müller, M. Wagner, J. Haselbauer, O. Uwira, W. Spies, E. Jennewein, R. Becker, M. Kleinod, U. Pröbstel, N. Angert, J. Klabunde, P. H. Mokler, P. Spädtke, B. Wolf:</i>	Recombination of free electrons with U ²⁸⁺ ions.....	205
<i>R. Ali, C. P. Bhalla, C. L. Cocke, M. Schulz, M. P. Stöckli:</i>	X-rays from electron bombardment of heliumlike argon	207
<i>P. Beiersdorfer, S. Chantrenne, M. H. Chen, R. E. Marrs, D. A. Vogel, K. L. Wong, R. Zasadzinski:</i>	Dielectronic recombination into Rydberg levels of lithiumlike titanium	209

<i>W. G. Graham, K. H. Berkner, E. M. Bernstein, M. W. Clark, B. Feinberg, M. A. McMahan, T. J. Morgan, W. Rathbun, A. S. Schlachter, J. A. Tanis:</i> Measurements of resonant transfer and excitation cross sections for U ⁹⁰⁺ projectiles in H ₂	213
<i>P. Zimmerer, N. Grün, W. Scheid:</i> Relativistic Auger rates for dielectronic recombination with highly-charged few-electron ions	215
<i>S. Bougouffa:</i> Channel-coupling effects in electron-atom collisions	217
<i>S. Khardi, M. C. Buchet-Poulizac, J. P. Buchet, A. Denis, J. Desesquelles, S. Martin, Y. Ouerdane:</i> Doubly excited states in lithiumlike Si XII, S XIV, and Ar XVI	219
<i>N. Vaeck, J. E. Hansen:</i> Calculations of decay rates for triply-excited states in N ²⁺	221
<i>Y. Kanai, H. A. Sakaue, S. Ohtani, K. Wakiya, H. Suzuki, T. Takayanagi, T. Kambara, A. Danjo, M. Yoshino, Y. Awaya:</i> Electron spectroscopy of doubly-excited helium-like ions	225
<i>R. Bruch, H. Wang, D. Schneider, L. Lipsky, M. J. Conneely:</i> Doubly excited states of three-electron systems (Z = 2 to 10) below the (1s2l) SL π threshold	227
<i>E. M. Bernstein, M. W. Clark, J. A. Tanis, W. G. Graham, T. J. Morgan, M. P. Stöckli, K. H. Berkner, A. S. Schlachter, J. W. Stearns:</i> Enhanced radiative Auger emission from lithiumlike ₂₀ Ca ¹⁷⁺	231
<i>Th. Stöhlker, Ch. Kozhuharov, A. E. Livingston, P. H. Mokler, J. Ullrich, B. Fricke:</i> Two-photon decay of the 1s2s ¹ S ₀ state in ₃₆ Kr ³⁴⁺ produced by resonant transfer and excitation	233
<i>A. C. Roy:</i> Ionization of atoms by fully stripped ions in the Glauber approximation	235
<i>T. Mukoyama, C.-D. Lin:</i> Distortion approximation for inner-shell ionization cross sections in ion-atom collisions using relativistic pseudostates	237
<i>J. O. P. Pedersen, P. Hvelplund, A. G. Petersen, P. D. Fainstein:</i> Two-center effects in electron emission from the impact of fast, multiply-charged projectiles on helium	239
<i>A. L. Ford, J. F. Reading:</i> Two-electron transitions in high energy ion-helium collisions	241
<i>C. C. Havener, M. P. Nesnidal, M. R. Porter, R. A. Phaneuf:</i> Electron capture in slow collisions of multicharged ions with hydrogen atoms using merged beams	243
<i>L. F. Errea, B. Herrero, L. Méndez, O. Mó, A. Riera:</i> Partial charge exchange and excitation cross sections for C ³⁺ + H collisions	245
<i>L. R. Andersson, R. McCarroll:</i> Diabatic description of electron capture by highly-charged ions from hydrogen ..	247
<i>F. Melchert, W. Debus, S. Krüdener, R. Schulze, R. E. Olson, E. Salzborn</i> Neutralization efficiency of H ⁻ beams based on measurements of one- and two-electron removal from H ⁻ in H ⁻ + Ar ^{q+} (q ≤ 8) collisions	249
<i>H. Martínez, I. Alvarez, C. Cisneros, J. de Urquijo:</i> Single electron capture of Ne ⁺ in He in the energy range 0.5 to 5 keV	253

<i>J. P. M. Beijers, R. Hoekstra, A. R. Schlatmann, R. Morgenstern, F. J. de Heer:</i>	
Core-changing versus core-conserving charge transfer in Ne ⁶⁺ - He collisions.....	255
<i>H. Tawara, T. Tonuma, H. Kumagai, T. Matsuo, H. Shibata:</i>	
Multiply-charged ions and cluster ions produced from frozen CO ₂ and H ₂ O targets in energetic, heavy ion collisions....	257
<i>R. D. DuBois, R. Herrmann, J. Feng, R. Dörner, J. Euler, K. Ullmann:</i>	
Correlations between charged particles emitted in ion-molecule collisions.....	259
<i>H. Lebius, H. Köhler, K. Wiesemann, B. A. Huber:</i>	
Dissociation of D ₂ molecules in collisions with multiply charged ions.....	261
<i>F. Folkmann:</i>	
Satellite structure of chromium K-alpha x-rays, induced by 1.0 and 1.4 MeV/u heavy ions.....	263
<i>L. Guillemot, P. Roncin, M. N. Gaboriaud, H. Laurent, M. Barat:</i>	
A critical study of the molecular coulombic barrier model (MCBM) for multiple electron capture.....	267
<i>J. Pascale, R. E. Olson, C. O. Reinhold:</i>	
State-selective capture in collisions between ions and alkali-metal atoms.....	269
<i>H. Lebius, B. A. Huber:</i>	
Electron capture by metastable Ar ⁸⁺ (2p ⁵ 3s) ions in He	271
<i>V. V. Afrosimov:</i>	
Population of excited states by charge exchange in multiply charged ion-atom collisions.....	273
<i>A. Salmoun, A. El Motassadeq, M. Druetta:</i>	
Subshell selective electron capture in collisions of X ⁵⁺ (X = C, N, O, Ar) with H ₂ at 50 keV	275
<i>S. Martin, Y. Ouerdane, A. Denis, M. Carré:</i>	
Photon recoil ion-projectile coincidences in multicapture processes of Kr ¹⁸⁺ + Kr collisions: "doubly excited Rydberg states with n = 10, ..., 15; and l = 9, ..., 14"	277
<i>R. Schulze, M. Liehr, E. Salzborn:</i>	
Electron emission in collisions of the bare ions He ²⁺ and Li ³⁺ with molecular hydrogen	279
<i>P. Moretto-Capelle, P. Benoit-Cattin, A. Bordenave-Montesquieu, A. Gleizes:</i>	
Collision velocity dependence of double capture processes in N ⁷⁺ and Ne ⁸⁺ + He systems (v = 0.18 to 0.61 au)	283
<i>J. H. Posthumus, P. Lukey, R. Morgenstern:</i>	
Double electron capture into highly charged ions: correlated or independent? ...	285
<i>J. H. Posthumus, P. Lukey, R. Morgenstern:</i>	
Coincidence measurements between electrons from projectile autoionization and target ions in specific charge states.....	287
<i>P. Boduch, M. Chantepie, D. Hennecart,</i>	
<i>X. Husson, H. Kucal, D. Lecler, N. Stolterfoht, B. C. Fawcett:</i>	
Single and double electron capture in 105 keV Ar ⁷⁺ - He(H ₂) collisions	289
<i>D. H. Jakubaßa-Amundsen:</i>	
Electron transfer in nuclear reactions	291

<i>P. Kürpick, W.-D. Sepp, B. Fricke:</i>	Inclusive probabilities for the scattering system 16 MeV-S ¹⁶⁺ on Ar	293
<i>T. Kambara, Y. Awaya, Y. Kanai, R. Dörner, H. Schmidt-Böcking:</i>	Azimuthal angular dependence of the K-x-ray emission in swift Ne ⁷⁺ - Ne collisions	295
<i>A. S. Aynacioglu, S. Heumann, G. von Oppen:</i>	Study of the 4d-4f coherence of impact-excited He atoms by observing 1s3d-1s2p transitions.....	297
<i>A. González, S. Hagmann, T. Quinteros, B. Krässig, R. Koch, A. Skutlartz, H. Schmidt-Böcking:</i>	Strong directional out-of-plane scattering in multiple ionizing highly-charged ion-atom collisions	299
<i>C. Kelbch, S. Hagmann, R. Koch, G. Kraft, R. E. Olson, H. Schmidt-Böcking, J. Ullrich:</i>	δ-Electron emission in fast, highly-charged heavy ion-atom collisions	301
<i>B. Kraus, K.-H. Schartner, F. Folkmann, A. E. Livingston, P. H. Mokler:</i>	EUV spectra from Ne and Ar recoil ions induced by 1.4 MeV/u heavy ion beams	303
<i>B. Kraus, K.-H. Schartner, F. Folkmann, A. E. Livingston, P. H. Mokler:</i>	Strong contributions from Rydberg transitions in EUV radiation from beam-foil excited heavy ions at 1.4 MeV/u	305
<i>S. Fuelling, R. Bruch, G. Liu, M. Bailey, E. A. Rauscher, E. Träbert, P. H. Heckmann:</i>	Absolute state selective cross sections for ionization-excitation and excitation of helium in e ⁻ + He, H ⁺ + He, H ₂ ⁺ + He and H ₃ ⁺ + He collisions.....	309
<i>S. Fuelling, R. Bruch, E. A. Rauscher, G. Liu, E. Träbert, P. H. Heckmann:</i>	Absolute state selective cross sections for ionization-excitation of helium in fast H ⁺ + He and C ⁶⁺ + He collisions: Z _p -dependence	313
<i>G. Zschornack, G. Musiol, V. Pohl, A. Reichmann, M. Schiekel:</i>	A computer-aided crystal diffraction spectrometer for precision measurements of characteristic X-rays from highly-charged heavy ions	315
<i>P. S. Antsiferov, V. G. Movshev:</i>	Status of the EBIT project at the Institute of Spectroscopy	317
<i>G. D. Shirkov:</i>	Elastic ion collisions in multiply-charged ion sources	319
<i>V. B. Kutner, G. D. Shirkov:</i>	Calculation of ion charge distribution in the Dubna ECRIS-14.....	323
<i>M. Liehr, M. Schlapp, E. Salzborn:</i>	A 10 GHz electron-cyclotron-resonance (ECR) ion source for ion-electron and ion-atom collision studies	327
<i>A. Cassimi, J. P. Grandin, M. G. Suraud:</i>	Charge state distributions of 44 MeV/amu ¹²⁹ Xe ⁴⁴⁺ and 29 MeV/amu ²⁰⁸ Pb ⁵⁶⁺ after various solid targets	329
<i>J. P. Rozet, A. Chetioui, P. Nicolai, M. Chabot, M. F. Politis, A. Touati, D. Vernhet, K. Wohrer, C. Stephan, J. P. Grandin:</i>	Evolution of fine structure populations as a test of solid target effects	331
<i>O. Heil, R. Maier, R. D. DuBois, M. Kuzel, K. O. Groeneveld:</i>	Doubly differential electron emission cross sections for He ⁰ (0.5 MeV/amu) → He collisions.....	333

<i>E. D. Donets, V. G. Dudnikov, V. B. Dunin, S. V. Kartashov:</i> Highly-charged ion-at-surface spectroscopy	337
<i>M. Schulz, C. L. Cocke, M. Stöckli, S. Hagmann, H. Schmidt-Böcking:</i> K x-ray and Auger emission from H-like Ar ions slowly approaching a Ge surface	341
<i>J. J. Bonnet, A. Fleury, M. Bonnefoy, M. Chassevent, T. Lamy, A. Brenac, A. Simionovici, H. J. Andrä, S. Andriamonje:</i> High resolution X-ray study of multi charged ions in collisions with surfaces.....	343
<i>P. Moretto-Capelle, A. Bordenave-Montesquieu, P. Benoit-Cattin, S. Andriamonje, H. J. Andrä:</i> Two and three electron Auger transitions in collisions of highly charged ions with surfaces	347
<i>S. Andriamonje, H. J. Andrä, A. Simionovici:</i> Two electron-one photon X-ray emission in slow collisions between fully stripped ions and solids.....	349
<i>L. Folkerts, R. Morgenstern:</i> Neutralization of H-like ions at a W-surface: via Auger cascades?	351
<i>U. Wille:</i> Adiabatic orbitals of the ion-image-charge system in ion-metal-surface scattering.....	353
<i>Yu. Ts. Oganessian, Yu. V. Lobanov, A. G. Popeko, F. Sh. Abdullin, Yu. P. Kharitonov, A. A. Ledovskoy, Yu. S. Tsypganov:</i> The average equilibrium charge-states of heavy ions with $Z > 60$ stripped in He and H_2	357
<i>A. S. Schlachter:</i> The advanced light source - A new tool for research in atomic physics.....	359