

Elias Roussos

Education

- 2005–2008 **PhD in Space Plasma Physics**, *Technical University of Braunschweig*, Braunschweig, Germany.
- 2003–2004 **MSc in Space Studies**, *International Space University*, Strasbourg, France.
- 1998–2003 **Bsc in Physics and Astronomy**, *University of Athens*, Athens, Greece.

Academic/Research positions

- 2009–today **Max Planck Institute for Solar System Research**, *Goettingen, Germany*, Senior Scientist.
- 2005–2008 **Max Planck Institute for Solar System Research (colab. with TU Braunschweig)**, *Goettingen, Germany*, PhD research.
Dissertation:, *Interactions of weakly or non-magnetized bodies with solar system plasmas: Mars and the moons of Saturn.*
- 2004 **ESA/ESTEC (colab. with ISU, France)**, *Noordwijk, Netherlands*, MSc research.
- 2003 **Univ. of Athens, Physics Department**, *Athens, Greece*, Undergraduate research.

Honors and Awards

- 2012 **Editors' Citation for Excellence in Refereeing - Geophysical Research Letters.**
- 2011 **EGU Outstanding Young Scientist Award**, *Division Planetary and Solar System Sciences.*
- 2009 **Max Planck Society's Otto-Hahn Medal for outstanding PhD research.**
- 2003 **ESA and SES-Global Scholarship for MSc studies.**

Areas of Research and number of lead author publications

Outer planet radiation belts, 12.

Moon and ring-magnetosphere interactions, 11.

Dynamics of outer planet magnetospheres (excluding radiation belts), 4.

Energetic particles in the heliosphere, 3.

Energetic particle detector response simulations, in-flight calibration, 2.

Mars-Solar wind interaction, 1.

Future space missions, 1.

* *Certain papers can be relevant for more than one area of research*

Project Involvement, Major Collaborations

- 2019 – today **ESA Space Plasma instrument definition team, Deep Space Gateway.**
- 2019 – today **Collaboration with the Chinese Academy of Sciences (CAS).**
- 2018 – today **MPS - University of Beijing (PKU) collaboration.**
- 2015 – today **Co-Investigator on Plasma Instrument for Magnetic Sounding (PIMS) experiment on Europa Clipper mission.**
- 2013 – today **Co-Investigator on Plasma Environment Package (PEP) (JUICE mission).**
- 2013 – today **Co-Investigator on J-MAG (JUICE mission).**
- 2013 – 2016 **JUICE Charging Analysis Tool, ESA project.**
- 2005 – today **Research scientist, Cassini Magnetospheric Imaging Instrument (MIMI).**
- 2005 – 2008 **Research scientist, Mars Express ASPERA-3 instrument.**

Academic service

Mentoring of Postgraduate researchers and Graduate students

- **C. Yuan (postdoc., with CAS/China):** Outer planet radiation belts (10/2018 - present)
- **Y. Sun (with PKU/China):** Electron acceleration in Saturn's radiation belts (grad. in 2021)
- **H. Huybrighs (with IRF/Kiruna):** Search for Europa's plumes in Galileo data (grad. 12/18)
- **B. Palmaerts (with LPAP/Liege):** Pulsed electron acceleration at Saturn (grad. 06/17)
- **A. Kotova (with Univ. of Toulouse):** GCR access in Saturn's magnetosphere (grad. 09/16)
- **L. Regoli (with UCL):** Titan's energetic particle and plasma environment (grad. 06/16)
- **M. Andriopoulou:** Signatures of convection in Saturn's radiation belts (grad. 01/14)
- **P. Kollmann:** The average structure of Saturn's radiation belts (grad. 03/12)
- **G. Rusty (M.Sc., with IRF/Kiruna):** CAD model of Galileo/EPD instrument (grad. 09/16)

Additional activities

- 2018 – today **Introductory lectures on Planetary magnetospheres, Univ. of Goettingen.**
- 2016 – today **Thesis examiner (Univ. of Umea; Univ. of Toulouse; Univ. of Liege).**
- 2013 – today **Topical Editor in Annales Geophysicae (Copernicus publications).**
- 2012 **Tutor of Alpach Summer School on Exploration of Giant Planets.**
- 2006 – today **Regular reviewer of articles, book chapters, proposals, datasets.**

Refereed publication and presentation statistics (2005–today)

Publications: 120 (5 book chapters, 115 journal articles, 21 lead author, 6 in Nature/Science)

Citations: ~1960, H-index: 27

Presentations: >100 oral or poster contributions, 15 invited

Research highlights

- 1 Detection and characterization of a proton radiation belt inward of Saturn's rings [97]
- 2 Discovery and origin of transient radiation belts at Saturn [101, 94]
- 3 A ring-generated, micro-radiation belt of MeV electrons at Saturn [98]
- 4 Solar cycle variability of planetary radiation belts [38]
- 5 Drift-resonant relativistic electron acceleration at Jupiter and Saturn [99]
- 6 Quasi-periodic, relativistic electron acceleration at the outer planets [104]
- 7 Exploring Jupiter's magnetosphere and radiation belts: future perspectives [80]

Selected Invited Presentations

- 1 The radiation belts of Saturn and Jupiter, University of Beijing, China, May 2018
- 2 Saturn's radiation belts after 13 years of Cassini MIMI/LEMMS observations, Magnetospheres of Outer Planets, Uppsala, Sweden, Jun. 2017
- 3 Plasma Environment Package (PEP) for the JUICE mission: aspects of radiation shielding design, Radiation Effects on Components and Systems Conference (Jupiter Topical Day), Bremen, Germany, Sep. 2016
- 4 Quasi-Periodic injections of relativistic electrons in Saturn's magnetosphere, European Planetary Science Congress, Cascais, Portugal, Sep. 2014
- 5 Saturn's radiation belts in the view of Cassini's MIMI/LEMMS observations, European Geosciences Union General Assembly, Vienna, Austria, Apr. 2013
- 6 Energetic charged particle absorption by Saturn's icy moons: future studies and new applications, European Planetary Science Congress, Potsdam, Aug. 2007

Publications List

- [1] M. Andriopoulou, **Roussos, E.**, N. Krupp, C. Paranicas, M. Thomsen, S. Krimigis, M. Dougherty, and K.-H. Glassmeier. A noon-to-midnight electric field and nightside dynamics in Saturn's inner magnetosphere, using microsignature observations. *Icarus*, 220(2):503–513, 2012.
- [2] M. Andriopoulou, **Roussos, E.**, N. Krupp, C. Paranicas, M. Thomsen, S. Krimigis, M. Dougherty, and K.-H. Glassmeier. Spatial and temporal dependence of the convective electric field in Saturn's inner magnetosphere. *Icarus*, 229:57–70, 2014.
- [3] C. Arridge, N. Achilleos, J. Agarwal, C. Agnor, R. Ambrosi, N. André, S. Badman, K. Baines, D. Banfield, M. Barthélémy, M. Bisi, J. Blum, T. Bocanegra-Bahamon, B. Bonfond, C. Bracken, P. Brandt, C. Briand, C. Briois, S. Brooks, J. Castillo-Rogez, T. Cavalié, B. Christophe, A. Coates, G. Collinson, J. Cooper, M. Costa-Sitja, R. Courtin, I. Daglis, I. De Pater, M. Desai, D. Dirkx, M. Dougherty, R. Ebert, G. Filacchione, L. Fletcher, J. Fortney, I. Gerth, D. Grassi, D. Grodent, E. Grün, J. Gustin, M. Hedman, R. Helled, P. Henri, S. Hess, J. Hillier, M. Hofstadter, R. Holme, M. Horanyi, G. Hospodarsky, S. Hsu, P. Irwin, C. Jackman, O. Karatekin, S. Kempf, E. Khalisi, K. Konstantinidis, H. Krüger, W. Kurth, C. Labrianidis, V. Lainey, L. Lamy, M. Laneuville, D. Lucchesi, A. Luntzer, J. MacArthur, A. Maier, A. Masters, S. McKenna-Lawlor, H. Melin, A. Milillo, G. Moragas-Klostermeyer, A. Morschhauser, J. Moses, O. Mousis, N. Nettelmann, F. Neubauer, T. Nordheim, B. Noyelles, G. Orton, M. Owens, R. Peron, C. Plainaki, F. Postberg, N. Rambaux, K. Retherford, S. Reynaud, **Roussos, E.**, C. Russell, A. Rymer, R. Sallantin, A. Sánchez-Lavega, O. Santolik, J. Saur, K. Sayanagi, P. Schenk, J. Schubert, N. Sergis, E. Sittler, A. Smith, F. Spahn, R. Srama, T. Stallard, V. Sterken, Z. Sternovsky, M. Tiscareno, G. Tobie, F. Tosi, M. Trieloff, D. Turrini, E. Turtle, S. Vinatier, R. Wilson, and P. Zarka. The science case for an orbital mission to Uranus: Exploring the origins and evolution of ice giant planets. *Planetary and Space Science*, 104(PA):122–140, 2014.
- [4] C. Arridge, C. Agnor, N. André, K. Baines, L. Fletcher, D. Gautier, M. Hofstadter, G. Jones, L. Lamy, Y. Langevin, O. Mousis, N. Nettelmann, C. Russell, T. Stallard, M. Tiscareno, G. Tobie, A. Bacon, C. Chaloner, M. Guest, S. Kemble, L. Peacocke, N. Achilleos, T. Andert, D. Banfield, S. Barabash, M. Barthelemy, C. Bertucci, P. Brandt, B. Cecconi, S. Chakrabarti, A. Cheng, U. Christensen, A. Christou, A. Coates, G. Collinson, J. Cooper, R. Courtin, M. Dougherty, R. Ebert, M. Entradas, A. Fazakerley, J. Fortney, M. Galand, J. Gustin, M. Hedman, R. Helled, P. Henri, S. Hess, R. Holme, O. Karatekin, N. Krupp, J. Leisner, J. Martin-Torres, A. Masters, H. Melin, S. Miller, I. Müller-Wodarg,

- B. Noyelles, C. Paranicas, I. de Pater, M. Pätzold, R. Prangé, E. Quémerais, **Roussos, E.**, A. Rymer, A. Sánchez-Lavega, J. Saur, K. Sayanagi, P. Schenk, G. Schubert, N. Sergis, F. Sohl, E. Sittler Jr., N. Teanby, S. Tellmann, E. Turtle, S. Vinatier, J.-E. Wahlund, and P. Zarka. Uranus Pathfinder: Exploring the origins and evolution of Ice Giant planets. *Experimental Astronomy*, 33(2-3):753–791, 2012.
- [5] C. Arridge, N. André, H. McAndrews, E. Bunce, M. Burger, K. Hansen, H.-W. Hsu, R. Johnson, G. Jones, S. Kempf, K. Khurana, N. Krupp, W. Kurth, J. Leisner, C. Paranicas, **Roussos, E.**, C. Russell, P. Schippers, E. Sittler, H. Smith, M. Thomsen, and M. Dougherty. Mapping magnetospheric equatorial regions at Saturn from Cassini prime mission observations. *Space Science Reviews*, 164(1-4):1–83, 2011.
- [6] C. Arridge, J. Jasinski, N. Achilleos, Y. Bogdanova, E. Bunce, S. Cowley, A. Fazakerley, K. Khurana, L. Lamy, J. Leisner, **Roussos, E.**, C. Russell, P. Zarka, A. Coates, M. Dougherty, G. Jones, S. Krimigis, and N. Krupp. Cassini observations of Saturn’s southern polar cusp. *Journal of Geophysical Research A: Space Physics*, 121(4):3006–3030, 2016.
- [7] B. J. Buratti, P. C. Thomas, **Roussos, E.**, C. Howett, M. Seiß, A. R. Hendrix, P. Helfenstein, R. H. Brown, R. N. Clark, T. Denk, G. Filacchione, H. Hoffmann, G. H. Jones, N. Khawaja, P. Kollmann, N. Krupp, J. Lunine, T. W. Momary, C. Paranicas, F. Postberg, M. Sachse, F. Spahn, J. Spencer, R. Srama, T. Albin, K. H. Baines, M. Ciarniello, T. Economou, H.-W. Hsu, S. Kempf, S. M. Krimigis, D. Mitchell, G. Moragas-Klostermeyer, P. D. Nicholson, C. C. Porco, H. Rosenberg, J. Simolka, and L. A. Soderblom. Close cassini flybys of saturn’s ring moons pan, daphnis, atlas, pandora, and epimetheus. *Science*, 2019.
- [8] A. Bößwetter, S. Simon, T. Bagdonat, U. Motschmann, M. Fränz, **Roussos, E.**, N. Krupp, J. Woch, J. Schüle, S. Barabash, and R. Lundin. Comparison of plasma data from ASPERA-3/Mars-Express with a 3-D hybrid simulation. *Annales Geophysicae*, 25(8):1851–1864, 2007.
- [9] A. Bößwetter, S. Simon, T. Bagdonat, U. Motschmann, M. Fränz, **Roussos, E.**, N. Krupp, J. Woch, J. Schüle, S. Barabash, and R. Lundin. Comparison of plasma data from ASPERA-3/Mars-Express with a 3-D hybrid simulation. 2007.
- [10] J. F. Carbary, D. G. Mitchell, P. Kollmann, N. Krupp, and **Roussos, E.** Energetic Electron Periodicities During the Cassini Grand Finale. *Journal of Geophysical Research: Space Physics*, 122(12):12,229–12,235, Dec. 2017.
- [11] J. F. Carbary, D. G. Mitchell, P. Kollmann, N. Krupp, **Roussos, E.**, and M. K. Dougherty. Energetic Electron Pitch Angle Distributions During the Cassini Final Orbits. *Geophysical Research Letters*, 45(7):2911–2917, Apr. 2018.
- [12] G. Clark, C. Paranicas, D. Santos-Costa, S. Livi, N. Krupp, D. Mitchell, **Roussos, E.**, and W.-L. Tseng. Evolution of electron pitch angle distributions across Saturn’s middle magnetospheric region from MIMI/LEMMS. *Planetary and Space Science*, 104(PA):18–28, 2014.
- [13] J. F. Cooper, R. E. Johnson, P. Kollmann, **Roussos, E.**, and E. C. Sittler. Plasma, Neutral Atmosphere, and Energetic Radiation Environments of Planetary Rings. In M. S. Tiscareno and C. D. Murray, editors, *Planetary Ring Systems: Properties, Structure, and Evolution*, Cambridge Planetary Science, pages 363–398. Cambridge University Press, 2018.

- [14] K. Dialynas, **Roussos, Elias**, L. Regoli, C. P. Paranicas, S. M. Krimigis, M. Kane, D. G. Mitchell, D. C. Hamilton, N. Krupp, and J. F. Carbary. Energetic ion moments and polytropic index in saturn's magnetosphere using cassini/mimi measurements: A simple model based on kappa-distribution functions. *Journal of Geophysical Research: Space Physics*, Oct. 2018.
- [15] E. Dubinin, G. Chanteur, M. Fraenz, R. Modolo, J. Woch, **Roussos, E.**, S. Barabash, R. Lundin, and J. Winningham. Asymmetry of plasma fluxes at Mars. ASPERA-3 observations and hybrid simulations. *Planetary and Space Science*, 56(6):832–835, 2008.
- [16] E. Dubinin, M. Fraenz, J. Woch, **Roussos, E.**, J. Winningham, R. Frahm, A. Coates, F. Leblanc, R. Lundin, and S. Barabash. Access of solar wind electrons into the Martian magnetosphere. *Annales Geophysicae*, 26(11):3511–3524, 2008.
- [17] E. Dubinin, M. Fränz, J. Woch, **Roussos, E.**, S. Barabash, R. Lundin, J. Winningham, R. Frahm, and M. Acuña. Plasma morphology at mars. Aspera-3 observations. *Space Science Reviews*, 126(1-4):209–238, 2006.
- [18] E. M. Dubinin, M. Fraenz, J. Woch, **Roussos, E.**, J. D. Winningham, R. A. Frahm, A. Coates, F. Leblanc, R. Lundin, and S. Barabash. Access of solar wind electrons into the Martian magnetosphere. 2008.
- [19] M. Dumont, D. Grodent, A. Radioti, B. Bonfond, **Roussos, E.**, and C. Paranicas. Evolution of the Auroral Signatures of Jupiter's Magnetospheric Injections. *Journal of Geophysical Research: Space Physics*, Oct. 2018.
- [20] N. Edberg, D. Andrews, O. Shebanits, K. ?gren, J.-E. Wahlund, H. Opgenoorth, **Roussos, E.**, P. Garnier, T. Cravens, S. Badman, R. Modolo, C. Bertucci, and M. Dougherty. Extreme densities in Titan's ionosphere during the T85 magnetosheath encounter. *Geophysical Research Letters*, 40(12):2879–2883, 2013.
- [21] L. N. Fletcher, R. Helled, E. Roussos, G. Jones, S. Charnoz, N. André, D. Andrews, M. Bannister, E. Bunce, T. Cavalié, F. Ferri, J. Fortney, D. Grassi, L. Griton, P. Hartogh, R. Hueso, Y. Kaspi, L. Lamy, A. Masters, H. Melin, J. Moses, O. Mousis, N. Nettleman, C. Plainaki, J. Schmidt, A. Simon, G. Tobie, P. Tortora, F. Tosi, and D. Turrini. Ice Giant Systems: The scientific potential of orbital missions to Uranus and Neptune. *Plan. Space Sci.*, 191:105030, Oct. 2020.
- [22] M. Fränz, E. Dubinin, **Roussos, E.**, J. Woch, J. Winningham, R. Frahm, A. Coates, A. Fedorov, S. Barabash, and R. Lundin. Plasma moments in the environment of mars: Mars express ASPERA-3 observations. *Space Science Reviews*, 126(1-4):165–207, 2006.
- [23] M. Fränz, J. Winningham, E. Dubinin, **Roussos, E.**, J. Woch, S. Barabash, R. Lundin, M. Holmström, H. Andersson, M. Yamauchi, A. Grigoriev, R. Frahm, J. Sharber, J. Scherrer, A. Coates, Y. Soobiah, D. Linder, D. Kataria, E. Kallio, T. Säles, P. Riihelä, W. Schmidt, H. Koskinen, J. Kozyra, J. Luhmann, E. Roelof, D. Williams, S. Livi, C. Curtis, K. Hsieh, B. Sandel, M. Grande, M. Carter, J.-A. Sauvaud, A. Fedorov, J.-J. Thocaven, S. McKenna-Lawler, S. Orsini, R. Cerulli-Irelli, M. Maggi, P. Wurz, P. Bochsler, N. Krupp, K. Asamura, and C. Dierker. Plasma intrusion above Mars crustal fields-Mars Express ASPERA-3 observations. *Icarus*, 182(2):406–412, 2006.
- [24] Y. Futaana, X.-D. Wang, **Roussos, Elias**, N. Krupp, J.-E. Wahlund, K. Agren, M. Franz, S. Barabash, F. Lei, D. Heynderickx, P. Truscott, F. Cipriani, and D. Rodgers. Corotation Plasma Environment Model: An Empirical Probability Model of the Jovian Magnetosphere. *IEEE Transactions on Plasma Science*, 46(6):2126–2145, June 2018.

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- [26] M. Hedman, J. Burns, M. Tiscareno, C. Porco, G. Jones, **Roussos, E.**, N. Krupp, C. Paranicas, and S. Kempf. The source of Saturn’s G ring. *Science*, 317(5838):653–656, 2007.
- [27] M. M. Hedman, P. Helfenstein, R. O. Chancia, P. Thomas, E. Roussos, C. Paranicas, and A. J. Verbiscer. Photometric Analyses of Saturn’s Small Moons: Aegaeon, Methone, and Pallene Are Dark; Helene and Calypso Are Bright. *Astrophys. Journ.*, 159(4):129, Apr. 2020.
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- [29] H. L. F. Huybrighs, E. Roussos, A. Blöcker, N. Krupp, Y. Futaana, S. Barabash, L. Z. Hadid, M. K. G. Holmberg, O. Lomax, and O. Witasse. An Active Plume Eruption on Europa During Galileo Flyby E26 as Indicated by Energetic Proton Depletions. *Geophys. Res. Lett.*, 47(10):e87806, May 2020.
- [30] J. Jasinski, C. Arridge, L. Lamy, J. Leisner, M. Thomsen, D. Mitchell, A. Coates, A. Radioti, G. Jones, **Roussos, E.**, N. Krupp, D. Grodent, M. Dougherty, and J. Waite. Cusp observation at Saturn’s high-latitude magnetosphere by the Cassini spacecraft. *Geophysical Research Letters*, 41(5):1382–1388, 2014.
- [31] G. Jones, N. Krupp, H. Krüger, **Roussos, E.**, W.-H. Ip, D. Mitchell, S. Krimigis, J. Woch, A. Lagg, M. Fränz, M. Dougherty, C. Arridge, and H. McAndrews. Formation of Saturn’s ring spokes by lightning-induced electron beams. *Geophysical Research Letters*, 33(21), 2006.
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- [33] G. Jones, **Roussos, E.**, N. Krupp, C. Paranicas, J. Woch, A. Lagg, D. Mitchell, S. Krimigis, and M. Dougherty. Enceladus’ varying imprint on the magnetosphere of Saturn. *Science*, 311(5766):1412–1415, 2006.
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- [35] P. Kollmann, I. Cohen, R. C. Allen, G. Clark, E. Roussos, S. Vines, W. Dietrich, J. Wicht, I. de Pater, K. D. Runyon, R. Cartwright, A. Masters, D. Brain, K. Hibbits, B. Mauk, M. Gkioulidou, A. Rymer, R. McNutt, V. Hue, S. Stanley, and P. Brandt. Magnetospheric Studies: A Requirement for Addressing Interdisciplinary Mysteries in the Ice Giant Systems. *Space Sci. Rev.*, 216(5):78, June 2020.

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- [39] P. Kollmann, **Roussos, E.**, A. Kotova, L. Regoli, D. G. Mitchell, J. Carbary, G. Clark, N. Krupp, and C. Paranicas. Saturn's Innermost Radiation Belt Throughout and Inward of the D-Ring. *Geophysical Research Letters*, 45(20):10,912–10,920, Oct. 2018.
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- [41] P. Kollmann, **Roussos, E.**, C. Paranicas, N. Krupp, C. Jackman, E. Kirsch, and K.-H. Glassmeier. Energetic particle phase space densities at Saturn: Cassini observations and interpretations. *Journal of Geophysical Research: Space Physics*, 116(5), 2011.
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- [43] A. Kotova, **Roussos, E.**, P. Kollmann, N. Krupp, and I. Dandouras. Galactic Cosmic Rays access to the magnetosphere of Saturn. *Journal of Geophysical Research: Space Physics*, Dec. 2018.
- [44] A. Kotova, **Roussos, E.**, N. Krupp, and I. Dandouras. Modeling of the energetic ion observations in the vicinity of Rhea and Dione. *Icarus*, 258:402–417, 2015.
- [45] E. A. Kronberg, E. E. Grigorenko, A. Malykhin, L. Kozak, B. Petrenko, M. F. Vogt, E. Roussos, P. Kollmann, C. M. Jackman, S. Kasahara, K. V. Malova, C. Tao, A. Radioti, and A. Masters. Acceleration of Ions in Jovian Plasmoids: Does Turbulence Play a Role? *Journal of Geophysical Research (Space Physics)*, 124(7):5056–5069, July 2019.
- [46] N. Krupp, A. Kotova, E. Roussos, S. Simon, L. Liuzzo, C. Paranicas, K. Khurana, and G. H. Jones. Magnetospheric Interactions of Saturn's Moon Dione (2005-2015). *Journal of Geophysical Research (Space Physics)*, 125(6):e27688, June 2020.
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