

Stanford



Sigrid Close

Associate Professor of Aeronautics and Astronautics and, by courtesy, of Electrical Engineering

CONTACT INFORMATION

- **Administrator**

Dana Parga - Administrative Associate

Email dparga@stanford.edu

Tel (650) 723-3775

Bio

BIO

Prof. Close's research involves space weather detection and modeling for improved spacecraft designs, and advanced signal processing and electromagnetic wave interactions with plasma for ground-to-satellite communication systems. These topics fall under the Space Situational Awareness (SSA) umbrella that include environmental remote sensing using satellite systems and ground-based radar. Her current efforts are the MEDUSSA (Meteoroid, Energetics, and Debris Understanding for Space Situational Awareness) program, which uses dust accelerators to understand the effects of hypervelocity particle impacts on spacecraft along with Particle-In-Cell simulations, and using ground-based radars to characterize the space debris and meteoroid population remotely. She also has active programs in hypersonic plasmas associated with re-entry vehicles.

ACADEMIC APPOINTMENTS

- Associate Professor, Aeronautics and Astronautics
- Associate Professor (By courtesy), Electrical Engineering

HONORS AND AWARDS

- Space Physics and Aeronomy Richard Carrington (SPARC) Education and Public Outreach Award, American Geophysical Union (2017)
- Vance D. and Arlene C. Coffman Faculty Scholar, Stanford University (2016-2020)
- DoE CAREER Award, DoE (2013-2017)
- Outstanding Professor in Aeronautics and Astronautics, Stanford University (2013)
- Presidential Early Career Award for Scientists and Engineers (PECASE), White House (2012)
- NSF CAREER Award, National Science Foundation (2011-2016)
- Hellman Faculty Scholar, Hellman Fellows Program (2010)
- Magazine Cover, IEEE Spectrum (2008)
- Joe D. Marshall Award for Outstanding Technical Briefing, AFTAC (2007)
- 1st Place Student Paper Competition, International Union of Radio Science (2002)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Fusion Energy Sciences Advisory Committee Member, Department of Energy (2017 - present)
- Elected Chair Commission G, URSI (2015 - present)
- Guest Expert, The Weather Channel (2015 - present)
- Guest Expert, PBS Chasing Pluto (2015 - present)
- Scientific Organizing Committee, Meteoroids 2016 (2015 - present)
- Elected Vice Chair Commission G, URSI (2013 - 2015)
- Member, Arecibo Science Advisory Panel (2011 - 2013)
- Co-Host National Geographic Channel, Known Universe (2011 - 2011)
- Guest Expert, PBS, Can We Make it to Mars (2011 - 2011)
- Micrometeoroid and Orbital Debris Panel Member, National Research Council Aeronautics and Space Engineering Board (2011 - 2011)
- Scientific Organizing Committee, Meteoroids 2010 (2010 - 2010)
- NEO Surveys and Hazard Mitigation Strategies Panel Member, National Research Council Aeronautics and Space Engineering Board (2009 - 2010)

LINKS

- Space Environment and Satellite Systems lab website: <http://sess.stanford.edu/>

Teaching

COURSES

2019-20

- Classical Dynamics: AA 242A (Aut)

2018-19

- Advanced Plasma Physics and Engineering: AA 244B (Spr)
- Classical Dynamics: AA 242A (Aut)
- Introduction to Plasma Physics and Engineering: AA 244A (Win)

2017-18

- Classical Dynamics: AA 242A (Aut)
- Introduction to the Space Environment: AA 251 (Spr)
- Surviving Space: AA 108N (Win)

2016-17

- Advanced Plasma Physics and Engineering: AA 244B (Spr)
- Classical Dynamics: AA 242A (Aut)
- Introduction to Plasma Physics and Engineering: AA 244A (Win)
- Why Go To Space?: AA 47SI (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Ruiqi Chen, Justin Kruger, Josh Sullivan

Doctoral Dissertation Advisor (AC)

Ben Estacio, Diana Juarez Madera, Brandon Paikoff, Gil Shohet, Ana Tarano, Sean Young

Orals Evaluator

Josh Sullivan

Master's Program Advisor

Somrita Banerjee, Efaine Chang, Kyle Cruff, Tunde Demuren, Adrien Descamps, Austin Finn, Christopher Naughton, Rina Onishi, Emi Soroka, Elida Sorto-Ramos, Leila Taleghani, Emily Widder

Publications

PUBLICATIONS

- **Mean thermo spheric density estimation derived from satellite constellations** *ADVANCES IN SPACE RESEARCH*
Li, A., Close, S.
2015; 56 (8): 1645-1657
- **Simulating plasma production from hypervelocity impacts** *PHYSICS OF PLASMAS*
Fletcher, A., Close, S., Mathias, D.
2015; 22 (9)
- **THE SOUTHERN ARGENTINA AGILE METEOR RADAR ORBITAL SYSTEM (SAAMER-OS): AN INITIAL SPORADIC METEOROID ORBITAL SURVEY IN THE SOUTHERN SKY** *ASTROPHYSICAL JOURNAL*
Janches, D., Close, S., Hormaechea, J. L., Swarnalingam, N., Murphy, A., O'Connor, D., Vandeppeer, B., Fuller, B., Fritts, D. C., Brunini, C.
2015; 809 (1)
- **An FDTD model of scattering from meteor head plasma** *JOURNAL OF GEOPHYSICAL RESEARCH-SPACE PHYSICS*
Marshall, R. A., Close, S.
2015; 120 (7): 5931-5942
- **Design and testing of miniaturized plasma sensor for measuring hypervelocity impact plasmas** *REVIEW OF SCIENTIFIC INSTRUMENTS*
Goel, A., Tarantino, P. M., Lauben, D. S., Close, S.
2015; 86 (4)
- **Plasma turbulence of nonspecular trail plasmas as measured by a high-power large-aperture radar** *JOURNAL OF GEOPHYSICAL RESEARCH-ATMOSPHERES*
Yee, J., Close, S.
2013; 118 (24): 13449-13462
- **Impact-Induced ESD and EMI/EMP Effects on Spacecraft-A Review** *IEEE TRANSACTIONS ON PLASMA SCIENCE*
Garrett, H. B., Close, S.
2013; 41 (12): 3545-3557
- **First Preliminary Results from US Round-Robin Tests** *IEEE TRANSACTIONS ON PLASMA SCIENCE*
Vayner, B. V., Ferguson, D. C., Hoffmann, R. C., Wheelock, A. T., Likar, J. J., Prebola, J. L., Crider, D. H., Schneider, T. A., Vaughn, J. A., Hoang, B., Steele, K., Close, S., Goel, et al
2013; 41 (12): 3310-3322
- **Detection of electromagnetic pulses produced by hypervelocity micro particle impact plasmas** *PHYSICS OF PLASMAS*
Close, S., Linscott, I., Lee, N., Johnson, T., Strauss, D., Goel, A., Fletcher, A., Lauben, D., Srama, R., Mocker, A., Bugiel, S.
2013; 20 (9)
- **Curved pleat folding for smooth wrapping** *PROCEEDINGS OF THE ROYAL SOCIETY A-MATHEMATICAL PHYSICAL AND ENGINEERING SCIENCES*
Lee, N., Close, S.
2013; 469 (2155)
- **The Meteoroid Input Function and predictions of mid-latitude meteor observations by the MU radar** *ICARUS*
Pifko, S., Janches, D., Close, S., Sparks, J., Nakamura, T., Nesvorny, D.
2013; 223 (1): 444-459

- **Theory and experiments characterizing hypervelocity impact plasmas on biased spacecraft materials** *PHYSICS OF PLASMAS*
Lee, N., Close, S., Goel, A., Lauben, D., Linscott, I., Johnson, T., Strauss, D., Bugiel, S., Mocker, A., Srama, R.
2013; 20 (3)
- **Plasma Turbulence of Non-Specular Trail Plasmas as Measured by a High Power Large Aperture Radar** *US-National-Committee-of-URSI National Radio Science Meeting*
Yee, J., Close, S.
IEEE.2013
- **Theory and experiments characterizing hypervelocity impact plasmas: Toward weatherproof spacecraft systems** *US-National-Committee-of-URSI National Radio Science Meeting*
Lee, N., Close, S.
IEEE.2013
- **Clustering and Confidence Intervals for Radar Target Identification and Estimation** *US-National-Committee-of-URSI National Radio Science Meeting*
Volz, R., Close, S., Erickson, P. J.
IEEE.2013
- **Inverse filtering of radar signals using compressed sensing with application to meteors** *RADIO SCIENCE*
Volz, R., Close, S.
2012; 47
- **Determining meteoroid bulk densities using a plasma scattering model with high-power large-aperture radar data** *ICARUS*
Close, S., Volz, R., Loveland, R., Macdonell, A., Colestock, P., Linscott, I., Oppenheim, M.
2012; 221 (1): 300-309
- **Measurements of freely-expanding plasma from hypervelocity impacts** *INTERNATIONAL JOURNAL OF IMPACT ENGINEERING*
Lee, N., Close, S., Lauben, D., Linscott, I., Goel, A., Johnson, T., Yee, J., FLETCHER, A., Srama, R., BUGIEL, S., Mocker, A., Colestock, P., Green, et al
2012; 44: 40-49
- **Analysis of electromagnetic and electrostatic effects of particle impacts on spacecraft** *ADVANCES IN SPACE RESEARCH*
Kelley, M. C., Pancoast, S., Close, S., Wang, Z.
2012; 49 (6): 1029-1033
- **Targeted Parameter Inflation Within Ground-Based Augmentation Systems to Minimize Anomalous Ionospheric Impact** *JOURNAL OF AIRCRAFT*
Seo, J., Lee, J., Pullen, S., Enge, P., Close, S.
2012; 49 (2): 587-599
- **Meteoroid head echo polarization features studied by numerical electromagnetics modeling** *RADIO SCIENCE*
Vertatschitsch, L. E., Sahr, J. D., Colestock, P., Close, S.
2011; 46
- **Coherent matched filter signal-processing algorithms for probing the ionosphere using broadband RF data** *JOURNAL OF GEOPHYSICAL RESEARCH-SPACE PHYSICS*
Close, S., FLETCHER, A., Dunham, M., Linscott, I.
2011; 116
- **A medium-scale traveling ionospheric disturbance observed from the ground and from space** *RADIO SCIENCE*
Dymond, K. F., Watts, C., Coker, C., Budzien, S. A., Bernhardt, P. A., Kassim, N., Lazio, T. J., Weiler, K., Crane, P. C., Ray, P. S., Cohen, A., Clarke, T., Rickard, et al
2011; 46
- **Analysis of ALTAIR 1998 meteor radar data** *JOURNAL OF GEOPHYSICAL RESEARCH-SPACE PHYSICS*
Zinn, J., Close, S., Colestock, P. L., MacDonell, A., Loveland, R.
2011; 116
- **Comparison of methods of determining meteoroid range rates from linear frequency modulated chirped pulses** *RADIO SCIENCE*
Loveland, R., MacDonell, A., Close, S., Oppenheim, M., Colestock, P.
2011; 46

- **Development and error analysis of nonlinear ionospheric removal algorithm for ionospheric electron density determination using broadband RF data** *JOURNAL OF GEOPHYSICAL RESEARCH-SPACE PHYSICS*
Lay, E. H., Close, S., Colestock, P., Bust, G.
2011; 116
- **Polarization and scattering of a long-duration meteor trail** *JOURNAL OF GEOPHYSICAL RESEARCH-SPACE PHYSICS*
Close, S., Kelley, M., Vertatschitsch, L., Colestock, P., Oppenheim, M., Yee, J.
2011; 116
- **Electromagnetic pulses generated by meteoroid impacts on spacecraft** *JOURNAL OF GEOPHYSICAL RESEARCH-SPACE PHYSICS*
Close, S., Colestock, P., Cox, L., Kelley, M., Lee, N.
2010; 115
- **Dependence of radar signal strength on frequency and aspect angle of non-specular trails** *J. Geophys. Res.*
Close, S., Hamlin, T., Oppenheim, M., Cox, L., Colestock, P.
2008; 113: A06203
- **Meteor head echo radar data: Mass-velocity selection effects** *Icarus*
Close, S., Brown, P., Campbell-Brown, M., Oppenheim, M., Colestock, P.
2007; 186: 547-556
- **A new method for determining meteoroid mass from head echo data** *J. Geophys. Res.*
Close, S., Oppenheim, M., Durand, D., Dyrud, L.
2005; 110: A09308
- **A technique for calculating meteor plasma density and mass from radar head echo scattering** *Icarus*
Close, S., Oppenheim, M., Hunt, S., Coster, A.
2004; 168: 43-52
- **Scattering characteristics of high-resolution meteor head echoes detected at multiple frequencies** *J. Geophys. Res.*
Close, S., Oppenheim, M., Hunt, S., Dyrud, L.
2002; 107: 1295
- **Analysis of Perseid meteor head echo data collected using the Advanced Research Projects Agency Long-Range Tracking and Instrumentation Radar (ALTAIR)** *Radio Sci.*
Close, S., Hunt, S., Minardi, M., McKeen, F.
2000; 35: 1233-1240