

## Project Details

**ROSES ID:** NRA-02-OSS-01

**Selection Year:** 2003

**Program Element:** Independent Investigation: LWS

### Project Title:

Observational Constraints in the Solar Wind Acceleration Region: The HERSCHEL Investigation (Helium Resonance Scattering in the Corona and Heliosphere)

**PI Name:** J. Moses

**PI Email:** dan.moses@nrl.navy.mil

**Affiliation:** US Naval Research Laboratory

### Project Member(s):

- Howard, Russell A; COI; Naval Research Laboratory
- Delaboudiniere, Jean-Pierre ; COI; Institute d'Astrophysique Spatiale
- Newmark, Jeffrey S; COI; Naval Research Laboratory
- Auchere, Frederic ; COI; Universities Space Research Association
- Fineschi, Silvano ; COI; SAO
- Romoli, Marco ; COI; Universita' di Firenze
- Pace, Emanuele ; COI; Università di Firenze
- Naletto, Giampiero ; COI; University of Padova
- Noci, Giancarlo ; COI; Universita' di Firenze
- Gardiol, Daniele ; COI; INAF - Osservatorio Astronomico di Torino
- Antonucci, Ester ; COI; INAF - Osservatorio Astronomico di Torino
- CACCIANI, ALESSANDRO ; COI; Univ of Rome
- Malvezzi, Marco ; COI; Università di Pavia
- Gursky, Herbert; Authorizing Official; Naval Research Laboratory
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### Summary:

**Proposal Objectives:** The proposed HERSCHEL (HElium Resonance Scatter in the Corona and HELiosphere) program will: investigate the slow and fast solar wind, determine the helium distribution and abundance in the corona, and test solar wind acceleration models; by obtaining simultaneous observations of the electron, proton and helium solar coronae. The HERSCHEL will establish proof-of-principle for the Ultra-Violet Coronagraph, which is in the ESA Solar Orbiter Mission baseline. The NRL Solar Physics Branch is joining with the Italian UVC Consortium to address the objectives of the International Living With a Star program with this combination of NASA suborbital program and ESA Solar Orbiter flight opportunities. Indeed, while the Solar Orbiter flight is still many years away, the 3 year program being proposed here is essential in order to prove the validity of this exciting new concept before the Solar Orbiter instrument selection is finalized. **Research Plan:** This proposal will fund a three-year effort to design, fabricate, test, launch and analyze data from novel instrumentation on a suborbital rocket. The work will be performed at NRL and a number of institutions in Italy. The current EIT CalRoc payload will be used as the basis for the electronic and on-disk imaging components of the HERSCHEL sounding rocket payload. The UVCI hardware for the sounding rocket will be fabricated by the Italian UVCI consortium. NRL will assist in the coronagraph design, integrate and test the payload, lead the launch operations, and share in the analysis and publication of the data. **Relevance to NASA LWS Programs:** This proposal aims to develop instrumentation that for the first time will directly image and characterize on a global coronal scale the two most abundant elements, hydrogen and helium. This will directly address three outstanding questions in the Sun-Earth Connection theme: 1) Origin of the slow solar wind, 2) Acceleration mechanism of the fast solar wind, and 3) Variation of Helium abundance in coronal structures. The characterization of the ambient solar wind is essential, as it directly effects transient and recurring space weather and influences the heliospheric passage and near-Earth impact of CMEs and SEPs. Lastly, by establishing proof of concept for the Solar Orbiter UVC, this mission fits the goals of the International Living With a Star (ILWS) program.

## Publication References:

**Summary:** "

**Reference:** Moses, J. NRL - Observational Constraints in the Solar Wind Acceleration Region: The HERSCHEL Investigation (Helium Resonance Scattering in the Corona and Heliosphere)

**Summary:** no summary

**Reference:**

Romoli, M.; Antonucci, E.; Fineschi, S.; Gardiol, D.; Zangrilli, L.; Malvezzi, M. A.; Pace, E.; Gori, L.; Landini, F.; Gherardi, A.; da Deppo, V.; Naletto, G.; Nicolosi, P.; Pelizzo, M. G.; Moses, J. D.; Newmark, J.; Howard, R.; Auchere, F.; Delaboudinière, J. P.; (2003), The Ultraviolet and Visible-light Coronagraph of the HERSCHEL experiment, SOLAR WIND TEN: Proceedings of the Tenth International Solar Wind Conference. AIP Conference Proceedings, Volume 679, pp. 846-849 (2003). doi: 10.1063/1.1618723

**Summary:** no summary

**Reference:** Fineschi, Silvano; Korendyke, Clarence M.; Moses, J. Dan; Thomas, Roger J.; (2004), Solar ultraviolet spectro-coronagraph with toroidal varied line-space (TVLS) grating, Optical, Infrared, and Millimeter Space Telescopes. Edited by Mather, John C. Proceedings of the SPIE, Volume 5487, pp. 1165-1173 (2004), doi: 10.1117/12.549417

**Summary:** no summary

**Reference:** Fineschi, Silvano; Moses, J. Dan; Thomas, Roger J.; (2005), Spectro-imaging of the extreme-UV solar corona, Solar Physics and Space Weather Instrumentation. Edited by Fineschi, Silvano; Viereck, Rodney A. Proceedings of the SPIE, Volume 5901, pp. 289-297 (2005), doi: 10.1117/12.617659