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G. Milikh<sup>1</sup>; A. Najmi<sup>1</sup>; Y. M. Yampolski<sup>2</sup>; A. V. Koloskov<sup>2</sup>; A. A. Sopin<sup>2</sup>; A. Zalizovski<sup>2</sup>; P. Bernhardt<sup>3</sup>; S. Briczinski<sup>3</sup>; C. Sieftring<sup>3</sup>; K. Chiang<sup>4</sup>; Y. Morton<sup>5</sup>; S. Taylor<sup>5</sup>; A. Mahmoudian<sup>1</sup>; W. Bristow<sup>6</sup>; M. Ruohoniemi<sup>7</sup>; K. Papadopoulos<sup>1</sup>

1. Departments of Physics and Astronomy, University of Maryland, College Park, MD
2. Institute of Radio Astronomy, National Academy of Sciences of Ukraine, Kharkov, Ukraine
3. Division of Plasma Physics, Naval Research Laboratory, Washington, DC
4. Department of Electrical Engineering, Cornell University, Ithaca, NY.
5. Department of Electrical and Computer Engineering, Miami University, Oxford, OH.
6. Geophysical Institute, University of Alaska-Fairbanks, AK
7. Department of Electrical and Computer Engineering, Virginia Polytechnic Institute, VA

## **Studies of the Ionospheric Turbulence Excited by the Fourth Gyroharmonic at HAARP**

Abstract:

We report the results of experiments conducted during the HAARP June 2014 campaign, whose objective was to study the development of artificial ionospheric turbulence. During the experiments, the heating frequency was stepped up near the 4th gyroharmonic, and the power of the heating HF radiation was varied. Our diagnostics included: measurements of phase-derived Slant Total Electron Content using the L1/L2 signals from PRN 25 GPS satellite received at HAARP; measurements of Stimulated Electromagnetic Emission (SEE) conducted 15 km away from the HAARP site; detection of the HAARP HF radiation at the Ukrainian Antarctic Station (UAS) located at 15.6 Mm distance from HAARP; ionograms from the HAARP digisonde and reflectance data from the Kodiak radar. Our observations showed: a distinct correlation between the broad upshifted maximum detected by the SEE and strong suppression of the HF signals detected at UAS station; that the drift velocity of the ionospheric irregularities causing HF scattering detected at the UAS station corresponds to that measured by the Kodiak radar; that the intensity of the scattered radar signals by Kodiak correlates with the amplitude of the downshifted maximum observed by the SEE.