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OFFICE OF NAVAL RESEARCH
PUBLICATIONS/PATENTS/PRESENTATIONS/HONORS REPORT

for

1 October 1987 through 30 September 1988

for

Contract N0014-79C-0769

"Research on Millimeter Wavelength Free Electron Lasers"

Principal Investigator: Thomas C. Marshall
Co-Principal Investigator: Amitava Bhattacharjee

School of Engineering and Applied Science
Columbia University
500 West 120th Street
New York, New York 10027

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PAPERS PUBLISHED

"Observations of Optical Guiding in a Raman Free Electron Laser," A. Bhattacharjee, S. Y. Cai, S. P. Chang, J. W. Dodd, and T. C. Marshall, *Physical Review Letters* **60**, 1254 [1988]

"Efficiency and Sideband Observations of a Raman FEL Oscillator with a Tapered Undulator," F. G. Yee, T. C. Marshall, and S. P. Schlesinger, *IEEE Transactions on Plasma Science* **16**, 162 [1988]

"Optical Guiding in a Raman FEL: Computation and Experiment," S. Y. Cai, S. P. Chang, J. W. Dodd, T. C. Marshall, *Nucl Instr & Meth in Phys Research*, , , [1988]

"Diffraction-Free Optical Beams in Inverse Free Electron Accelerators," S. Y. Cai, A. Bhattacharjee, and T. C. Marshall, *Nucl Instr & Meth in Phys Research*, , [1988]

"Efficiency and Sideband Observations of a Raman FEL Oscillator with a Tapered Undulator," F. G. Yee, T. C. Marshall, and S. P. Schlesinger, *Nucl Instr & Meth in Phys Research*, , [1988]

"Generation of Squeezed Radiation from a Free-Electron Laser*," I. Gjaja and A. Bhattacharjee, *Phys Rev* **A36**, 5486 [1987]

"Relativistic Quantum Dynamics and Quantum Noise in Short-Wavelength Free Electron Lasers*," I. Gjaja and A. Bhattacharjee, *Phys Rev* **A37**, 1009 [1988]

* Jointly supported by Brookhaven National Laboratory

PAPERS SUBMITTED

"Sideband Instabilities and Optical Guiding in a Free Electron Laser: Experiment and Theory": to *Nucl Instr & Meth in Physics Research*

"Optical Guiding and Sideband Experiments from the Columbia Raman FEL," *The Non-Neutral Plasma Physics Symposium, A. I. P. Conference Proceedings* sponsored by the ONR (T. C. Marshall, author)

TECHNICAL REPORTS (THESIS)

"Efficiency and Sideband Observations of a Raman FEL Oscillator with a Tapered Undulator," F. G. Yee [1988]

PATENTS FILED/GRANTED

None

INVITED PRESENTATIONS AT TOPICAL OR SCIENTIFIC & TECHNICAL CONFERENCES

Tenth International FEL Conference, Israel, August 1988:

"Sideband Instabilities and Optical Guiding in a Free Electron Laser"

"Effect of Optical Guiding on Sideband Instabilities in a FEL"

"Acceleration of Particles Due to Laser-Plasma Interactions in an Inverse FEL"

(papers presented at the conference by A. Bhattacharjee, for the Columbia FEL Group)

"Optical Guiding in FELs" — colloquia given by T. C. Marshall at:

Cornell University, April 1988

Sandia Laboratory, May 1988

Non-Neutral Plasma Physics Symposium, Washington D.C., March 1988

NSF Workshop "New Directions in Plasma Engineering," Berkeley, June 1988

HONORS, ETC.

None

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Graduate Students Supported Under Contract for the year ending 30 September 1988

Shao-Yang Cai
James W. Dodd (partial; picked up by NSF 12/1/87)
Fu-Goul Yee (completed doctoral work 9/30/88)
S. P. Chang (partial fellowship from Taiwan)
J. S. Cao

Brookhaven Fellow:

Toshiya Tanabe
Ivan Gjaja

POSTDOCTORALS SUPPORTED

None