Abstract Submitted for the DPP05 Meeting of The American Physical Society

Microprobe Development at the Basic Plasma Science Facility¹ PATRICK PRIBYL, WALTER GEKELMAN, Dept. Physics, UCLA, NOAM KATZ, Dept. Physics, MIT, MIO NAKAMOTO, Dept Physics, UCLA, JANET STILLMAN, FRANKLIN CHIANG, Dept, Elec. Engineering, UCLA — Sub-Debye length phenomena remain largely unexplored in laboratory experimental plasma physics. At BaPSF we are developing a variety of techniques to explore this regime. Development falls into two categories: first, several multi-tip Langmuir probes have been assembled by hand. These consist of up to four tips arranged in a row, composed of glass capillary tubes each pulled to a narrow tip and threaded with 25 micron wire. The closest tip to tip spacing is about 40 microns. Second, MEMS techniques have been used to fabricate a series of microprobes having regular spacing at 20 microns tip to tip, with pairs separated by 60 microns. These efforts afford high precision, although the probes are fairly short. Since the target structures exist on a Debye length scale, the number of electrons involved in the LAPD plasmas of interest might be less than 10^6 , for a charge of the order of 100 pC. Contributing to the problems, some of these structures are predicted to move at a significant fraction of the electron thermal speed, requiring sub-nanosecond time resolution. Consequently fast amplifiers must be located quite close to the probes; the 2 GHz amplifiers and the probe construction techniques are discussed.

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