accelerating fields of many proton bunches acting on a few initial thermal electrons. A simple calculation indictes the possible severity of the problem.

Let N_o = number of initial electrons

N_n = number of electrons after passage of n proton bunches

Y = average secondary electron yield

$N_n = Y^n N_o$.

We have calculated Y for both the short and long bunch cases for PSR, and for aluminum and stainless steel vacuum chamber walls:

	Short	Long
Aluminum	1.41	1.50
Stainless Steel	1.14	1.30

The figures for Al assume relatively clean surface. A possible result of electron multipactoring is desorption of gas from the walls. The above figures, if anywhere near the truth, indicate strong electron buildup and possibly a severe problem. SPEAR has not reported any such prolem, but there are worries about this at Isabelle. There is some fear that electrostatic position monitors may not work. We are investigating this problem with a hardware simulation.

Suggestion from audience is to flash titanium on the surface and forget it.

P. Apparatus for Measuring Beam Induced Electron Multipactoring, G. Spalek, LASL

The surface of the wire becomes part of the experiment. Does not simulate actuality. These are very small wires, but fields are high (completely different). We could read current on the central wire to see if we have a two-surface effect. Flashing Ti is expensive for the whole ring. Titanium pumps and holds gas, worry about pressure bumps. Titanium chambers are better for pressure bumps. Investigate CERN and PEP experience.

Q. Disk and Washer Structure, S. O. Schriber, CRNL

Efficiency of converting rf power to useful beam power was improved by the shaping of cavities as in the high-energy portion of LAMPF and other operating accelerators in the standing wave mode. Additional advantages were realized by selecting the $\pi/2$ mode as the operating mode. Introduction of the disk-and-washer structure interested many laboratories because of a factor of ten increase in coupling constant. Although rf conversion efficiency was slightly less than the LAMPF shaped cavities, the increase in coupling constant suggested that longer structures could be built and that tolerances would be improved.

A comparison of the LAMPF structure and the disk-and-washer structure shows that the disk-and-washer has an extra degree of freedom. Frequency characteristics are fixed by adjusting radii of the washer and the disk, while the outer cylinder radius can be selected to obtain better rf characteristics. As with the LAMPF structure the gap was optimized to give highest efficiency. Optimum disk width was also determined. Present calculations have shown that the choice of a large outer radius leads to improved rf conversion efficiency (up to 70% higher than an equivalent LAMPF structure), improved vacuum conductance, and more varied assembly methods.

The outer radius selected for most applications should not exceed 17 cm at 1.35 GHz to ensure that mode interference is not a problem and to maintain a high group velocity. With this restriction rf conversion efficiencies are 30% higher than an equivalent LAMPF cavity for $\beta = 1.0$ (ZT^2 at 1.35 GHz is 91 MΩ/m compared to 69 MΩ/m).

Radial supports are the preferred washer support because they represent a symmetrical support method. Experimental bead pulls with L supports (the original support) and T supports showed that on-axis fields from cavity to cavity change by ~ 19% because of changes in coupling constants. These changes can be compensated by displacing disks; however, mechanical difficulties are added and the system becomes quasiperiodic.

The disk-and-washer geometry can be used for many different applications, such as, storage ring cavities, proton linacs, electron linacs, etc. The geometry can be chosen to produce a "harmonic accelerator" which will have a time varying rf wave which is almost linear during passage of a beam bunch because the structure can be operated at two frequencies simultaneously - one twice the other. A geometry can be chosen which has high accelerating gradients (40 MeV/m at 3GHz) with a ZT^2 which is larger than an equivalent LAMPF cavity. Beam excited transverse modes can be Q spoiled or loaded by different techniques - outer wall of glassy material such as 304 SS, rotating stems, rotating dimpled washers and adding loading probes.