

Current Status of the FAUST Array

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Over the past ten years, the Forward Array Using Silicon Technology (FAUST) has been employed in several heavy ion reaction experiments [1-5]. During this time, manufacture has ceased on key components of both preamplifier designs used during the original construction of FAUST. This has left a situation where failing preamplifiers cannot be repaired or replaced. Manufacture of position sensitive silicon detectors (PSDs) have also improved over this time. PSDs are an economical way to increase the granularity of an array due to the reduced number of necessary electronics modules compared with silicon strip detectors of comparable position sensitivity. With this in mind, we have begun a two part upgrade to the FAUST array focusing on updating both the preamplifiers and improving the angular resolution of the array through the use of position sensitive silicon detectors.

During the summer of 2005, the Lecroy HQV810 silicon preamplifiers were replaced by the Indiana University (IU) preamplifier design. To accommodate the larger size of the IU preamps it was necessary to move the location of the preamps to the outside of the vacuum chamber. Previously the preamps had been located inside of the vacuum chamber to keep them physically close to the detectors thereby keeping the cable length between these two components small. Keeping the preamps close to the detector usually improves the resolution of a detector due to a reduction in electronic noise. Knowing that the IU preamps must be installed outside the FAUST vacuum chamber, tests were run to determine the effect of cable length on the resolution of the FAUST silicon detectors. It was determined that minimal signal degradation could be achieved with cable lengths of five feet or less. All of the preamplifiers installed during the upgrade are being mounted as to require a cable length no greater than 3.5 feet. Eight of the InterFet IFPA300 photodiode preamplifiers were also replaced with IU preamps to test the performance of these new preamplifiers when coupled with photodiodes. Preparations for the remainder of the upgrade were also completed at this time. This includes accommodating all 68 of the Si/CsI mounts for dual-lateral PSDs, as well as modifying the signal pass-through plate on the vacuum chamber. The new pass-through plate will allow for 464 signals and can be expanded to allow as many as 544 signals. The FAUST array that includes 68 dual-lateral PSDs will require 340 signals so there is adequate room for growth within the new design.

During the Fall 2005 and continuing into the Winter 2006, FAUST was run with the aforementioned partial upgrade. The Indiana Preamplifier design performed better than expected with the only concern being some micro-phonic sensitivity. It was observed that vibrations from the turbo-pumps caused standing waves in our preamplifier signals. This was easily solved through vibrational dampening and could be improved more through the use of better shielded cables. We observed isotopic resolution up to Oxygen during online analysis which is comparable with the best resolution previously achieved with the FAUST array. It is hoped that during full analysis, isotopic resolution will be seen up to Neon. The IU preamplifiers coupled with photodiodes also performed well and additional IU preamplifiers have been purchased to finish outfitting the array. Currently work is underway to develop dual-lateral design PSDs for installation during the second phase of the upgrade.

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