GLAST Tracker Payload Attachment Options
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September 12, 2000

I would like to motivate a discussion of options available for payload attachment. It is important to understand that uncertainty in this area is holding up the tray mechanical design, which could result in expensive delays and rework. Therefore, we need to narrow the range of options of concepts and adhesives down to a few that appear very likely to work. Then we need to make preliminary tests of them as soon as possible. This is most urgent for the standard trays (we expect the thick-converter tray development to lag somewhat). The tray mechanical design needs to have as input the coupling of the detectors to the face sheets and converters (i.e. approximate modulus of the adhesive and the thickness). I am listing below the various concepts that I am aware of, along with my own comments. I am not considering front-side biasing. That could be studied in parallel, but due to the tight schedule, we cannot drop design work on back-side biasing while we fully test a system with front-side biasing (in retrospect, we should have tested front-side biasing on some of the BTEM trays).

1. High modulus adhesive for the detector mechanical mounting (i.e. epoxy), with a low modulus conductive adhesive (i.e. silver-loaded silicone) for electrical attachment. The Hytec analysis suggests that this should work for the thin-converter layers, at least. Tests in progress at SLAC with silicon glued to aluminum will give some additional input. I would like to see a preliminary choice of the two adhesives and a bonding pattern, followed as soon as possible by testing it with dummy wafers on the 300um C face sheets, kapton, and 3.5% tungsten and/or lead converters. At the same time, thermal cycling tests and accelerated aging of the conductivity should be carried out at UCSC in the new setup put together for that purpose.
2. Low modulus adhesive for the detector mounting with a gold-copper alloy spring for electrical contact. This almost certainly works from the mechanical point of view, but there are questions about the robustness of the electrical contact. This could be tested soon by assembling a sheet of high purity aluminum onto a substrate with the kapton bias circuit. The aluminum would simulate the detector and would allow an easy measurement of the conductivity. Accelerated aging at high temperature plus thermal cycling might give us the necessary confidence in the electrical performance. We have some brazing alloy supplied by Ossie to make springs from, but we need a definite proposal for the silicone-type adhesive (i.e. perhaps the 2-component stuff that Kamae used in Astro-E and gave us samples of) and the thickness of the adhesive. There has been some discussion that the springs might be built into the bias circuit.
3. Low modulus adhesive in a rather thick layer (e.g. 250um) between the converter and the kapton, with some sort of conductive adhesive between kapton and detector. This could decouple the issues of modulus versus conductivity and may work well for thick as well as thin converters. This could be readily tested using dummy silicon if we are interested in this direction and have definite proposals for the adhesives to use. Maybe John Broeder could comment on possible difficulties with putting the kapton on in such a way.