

BaBar LST Detector: Electrical Connections

K. Honscheid
Ohio State University
Feb 21, 2003

In an attempt to understand how we will read-out the signals in the LST detector I created a drawing that shows all the relevant elements. The outer two grey blocks represent the magnet iron. For the z and ϕ strips I have included the strips, the ground plane, and a pc board connecting each strip to the read-out connector. The pink box indicated the streamer tube. A few wires and the internal matching resistors are also shown.

With this note I would like to address the question how the different elements are interconnected. The following information has been collected from several talks and presentations:

HV

Connector: Banana-style plug, one for each layer, i.e. two per tube
Cable: KERPEN SL-v2YCeH, 6kV DC, halogen free
37 wires, 13.3 mm cross section
(www.kerpenkabel.de)

Signal

Connector: Robinson Nugent P50E-34P1-SR1-TG
(could somebody let me know the URL to the data sheet for this connector?)
Cable: Amphenol 425 3016 034 micro-ribbon twist&flat
(www.spectra-strip.amphenol.com/ecpartsearch3.cfm?partID=278)

Questions:

ϕ strip signals:

How will we pick-up a pseudo differential signal? I assume, the strip signal goes to one "leg" of the twisted pair, the other is connected to the ϕ strip ground plane?

z strip signals:

How will we pick-up a pseudo differential signal? I assume, the strip signal goes to one "leg" of the twisted pair, the other is connected to the z strip ground plane?

HV anode:

Somehow/somewhere the multi-wire KERPEN cable is split up and a banana-style connector is installed on each HV wire.

HV cathode:

Since – in the baseline design – we have only a single ground wire – a fan-out system needs to be designed to connect the tube's cathodes. A banana-style connector will be used.

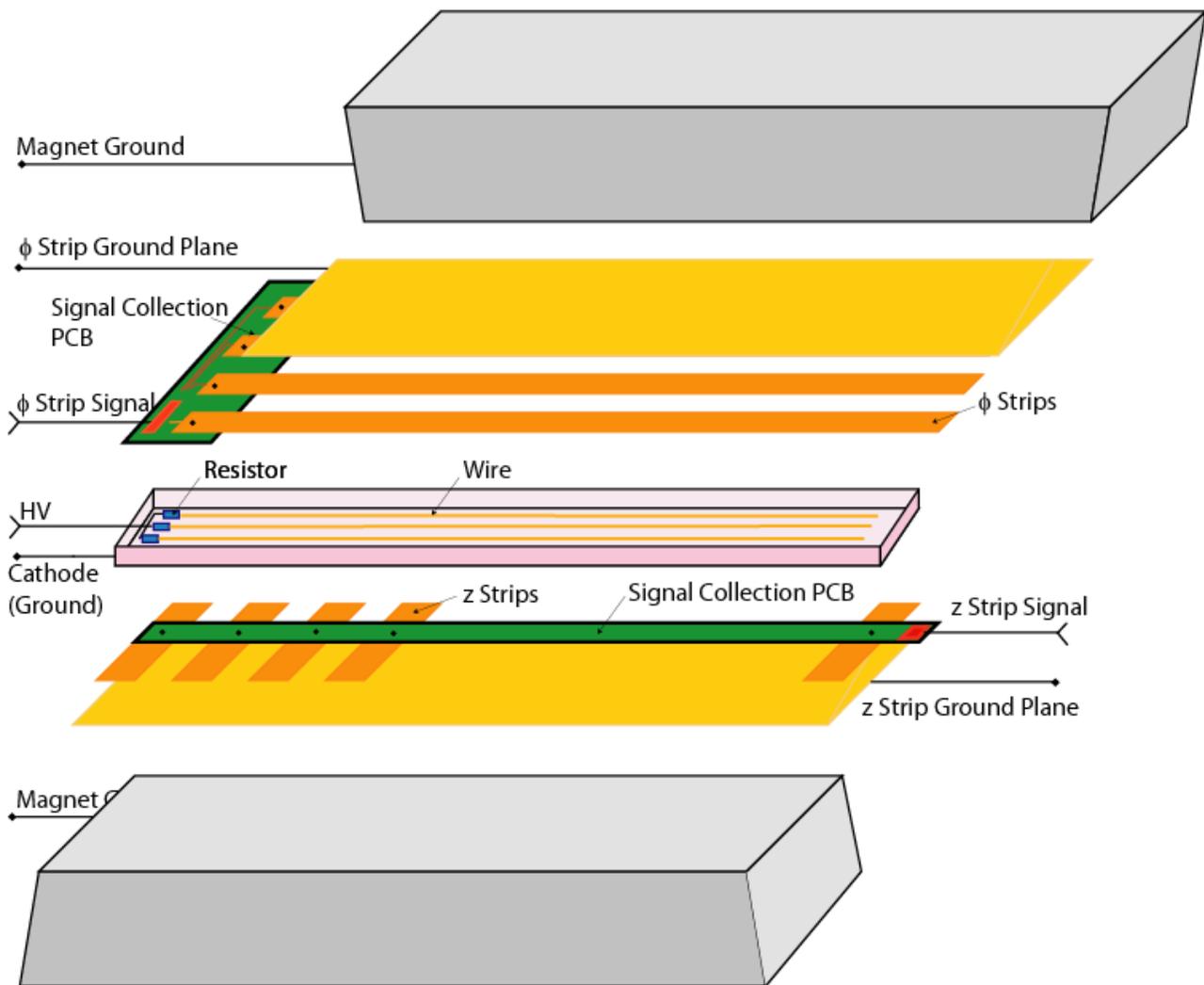


Figure 1 Schematic View of a BaBar LST Detector Element

Ground connections:

- Option a) connect the two strip ground planes to the cathode (tube) ground and to HV ground.
Note that this option will require a connection between the z strip assembly and the modules+ ϕ strips.
- Option b) connect cathode (tube) ground to HV ground. Leave the two strip ground planes floating.

Signal (RF) path:

The current baseline solution does not include a direct capacitive coupling between anodes and cathodes. This differs from the SLD design where a 2 nF capacitor between ground and HV is provided on a separate HV board mounted close (< 1 m) to the detector. A schematic drawing of the SLD strip read-out is shown in Figure 2. (NIM A290 353-369)

Question: Can we really live without a HV capacitor? Has this been tested?

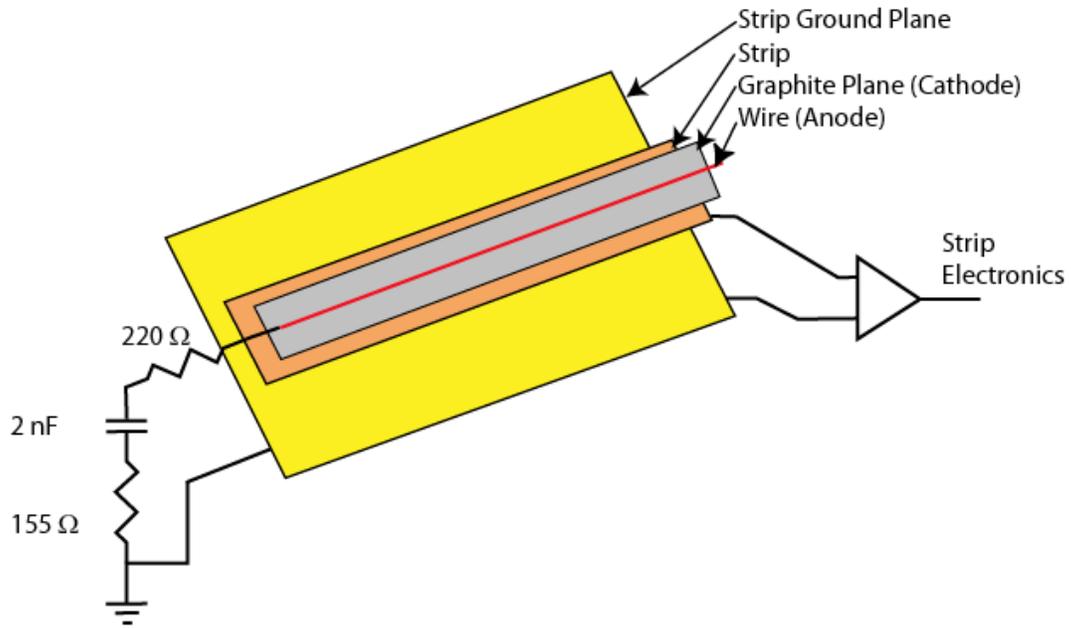


Figure 2 SLD Streamer Tube Read-Out

The 155 Ω resistor is included to reduce cross talk between channels. Its value was determined experimentally.

A possible connection scheme for BaBar is shown in Figure 3. A 1 – 2 nF capacitor and a 150 Ω resistor are added between the anode and ground. The strip ground planes, the graphite layer and HV ground are connected (marked in red). The strip signals are picked up between strip and strip ground plane.

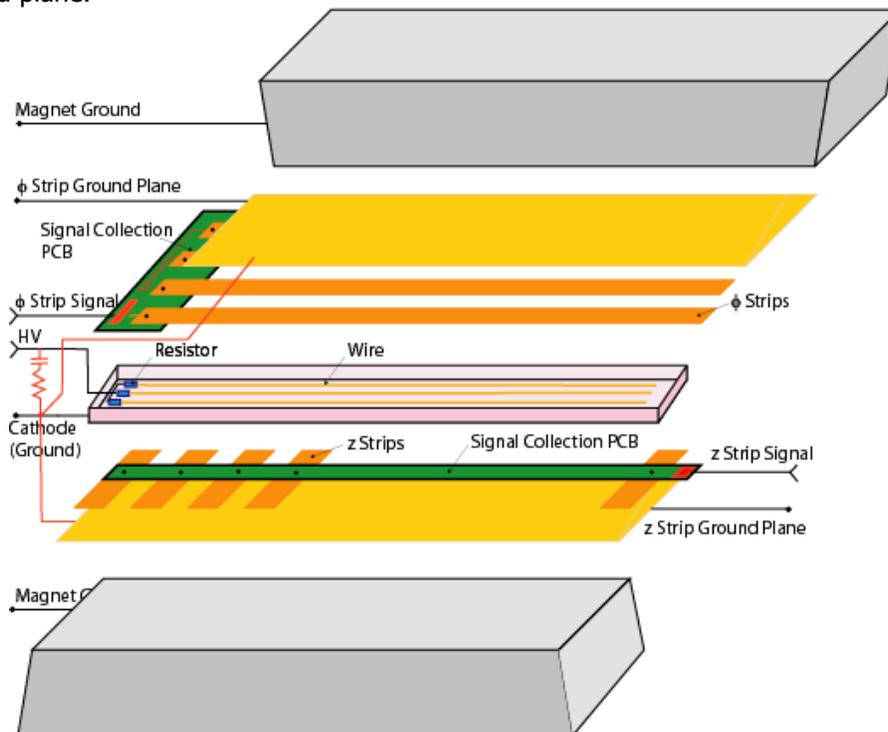


Figure 3 Possible connection scheme