

1 Analysis of the Structure of the TRT

1.1 TRT End Cap

The front-end electronics of the TRT - Figure 1-1 - mainly consists of a detecting element - the straw, an analogue 8-channel bipolar ASIC as amplifier, shaper, and baseline restorer - the ASDBLR - and a digital CMOS readout chip - the DTMROC. Each DTMROC is able to serve two ASDBLRs and 16 straws. The number of chips located at the front-end boards vary depending on the wheel type - A, B or C - and thus different topology and number of straws. For wheel A one of these modules consists of a DTMROC board with four DTMROCs and a ASDBLR board with eight ASDBLRs thus serving 64 straws. Six of these stack ups - two in axial (z) and three in azimuthal (ϕ) direction

Figure 3-1 shows the grounding scheme for the TRT end cap. The smallest unit of the end cap is 1/32 of one half of a wheel which is created by the granularity of the front-end boards and their power supplies. The ASDBLR and DTMROC boards have multiple signal connections between each other. Thus their ground planes are full planes which are connected tightly over multiple ground pins on their interface connectors. The power for these boards derives from a common input connector at the DTMROC board. The modularity for the power supplies is 1/32 of a complete wheel. Thus, the two halves have to be decoupled by the impedance Z of the power-supply filter.

The front-end electronics plugs onto the active webs. The cooling structure connects the two active webs and the two passive webs and provides a substantial ground plane. A copper-plated kapton sheet connects the inner seal and ring 1, which are capacitively coupled to the wires of the straws, to the ground plane of the active web. Because this connection is seen as a part of the signal return path, the "left" and "right" side are connected and force the return current of the "right" side to flow over the left "side" of the cooling structure. This connection is seen as a part of the signal return path, the "left" and "right" side are connected and force the return current of the "right" side to flow over the left "side" of the cooling structure.

way round. This enlarges the surface of the loop which is formed by the trace and the return path and causes an increased crosstalk with return currents from other signal traces and with the further environment.

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