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XTRP Algorithm for L1 Calorimeter Trigger Outputs

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1 Introduction

The Level 1 calorimeter trigger recieves track information from the XTRP. One eight bit word for each 15° wedge is sent from the XTRP to a pair of DIRAC boards. The purpose of this note is to outline the algorithm for generating the bits. The specification of the cable connection appears in TGN-96.

Each of the 8 bits represents a separate track threshold with the threshold defined by cuts on P_T, the track isolation bit (ISO), and on the short track bit (SL6/8). If a bit is on then a track passing the corresponding thresholds AND projecting to this calorimeter wedge has been found by the XFT.

2 The Algorithm

The condensed version of the algorithm is as follows:

1. For each input track to XTRP: apply trigger threshold (P_T, ISO, short track) in a lookup. In same lookup extrapolate track using P_T and ϕ.
2. Direct output bits from Extrapolation/Threshold RAM to extrapolated wedge: wedge to left, this wedge, or wedge to right.
3. "OR" together all bits for a given threshold that go *left*
4. "OR" together all bits for a given threshold that go *right*
5. Send data left and right

6. "OR" together all bits for a given threshold that come from *left, right* and *this* wedges.

Figure 1 shows schematicaly how to carry out this algorithm. It starts with 12 RAMs, one for each 1.25° segment of the XFT. The inputs are the 6 bits of P_T, sign bit, ISO bit and short track bit and the NN bits of mini ϕ. Each RAM has 16 output bits: 8 thresholds extrapolated to this wedge and the same 8 thresholds extrapolated to the adjacent wedge. For first (later) six of the RAMs the adjacent wedge information is sent to the adjacent XTRP board at lower (higher) phi.

Before sending data to each of these adjacent boards it is ORed down from six 8 bit words into one eight bit word with eight six input OR gates. This operation is carried out for both the lower and higher wedge data. A total of 64 bits must be sent to or from the adjacent boards: 8 bits to the next higher wedge, 8 bits from the next higher wedge 8 bits to the next lower wedge and 8 bits from the next lower wedge.

Finally a set of eight 14 input OR gates reduces the 12+2 eight bit words down to a single eight bit word.

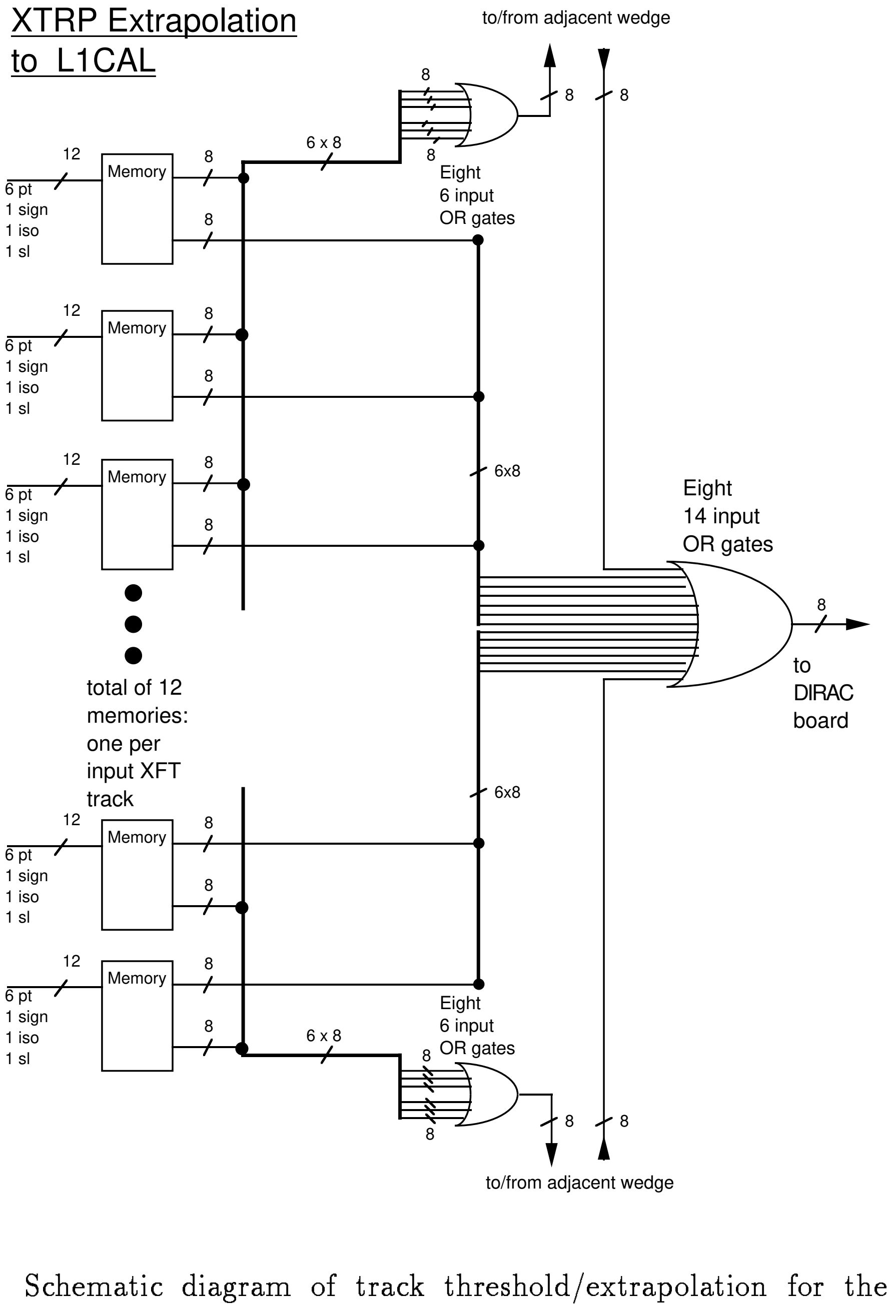

Figure 1: Schematic diagram of track threshold/extrapolation for the Level 1 calorimeter trigger. This extrapolation is done on the XTRP boards.