Beam Spot Correction and Impact Parameter Significance

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Beam Spot Position

- 2 arrays of 6 elements each, one for radius, one for phi of the beam spot at the center of each SMT barrel
- Use barrel of innermost hit to choose appropriate beam spot for correction
- Can be expanded to more than 6 beam spots to handle tracks that cross barrel boundaries – not yet implemented
- tsim_l2stt: array is filled via RCP parameters
- On the TFC: array is filled via 2 hex lookup tables
  - Eventually, this information will be downloaded from the appropriate place

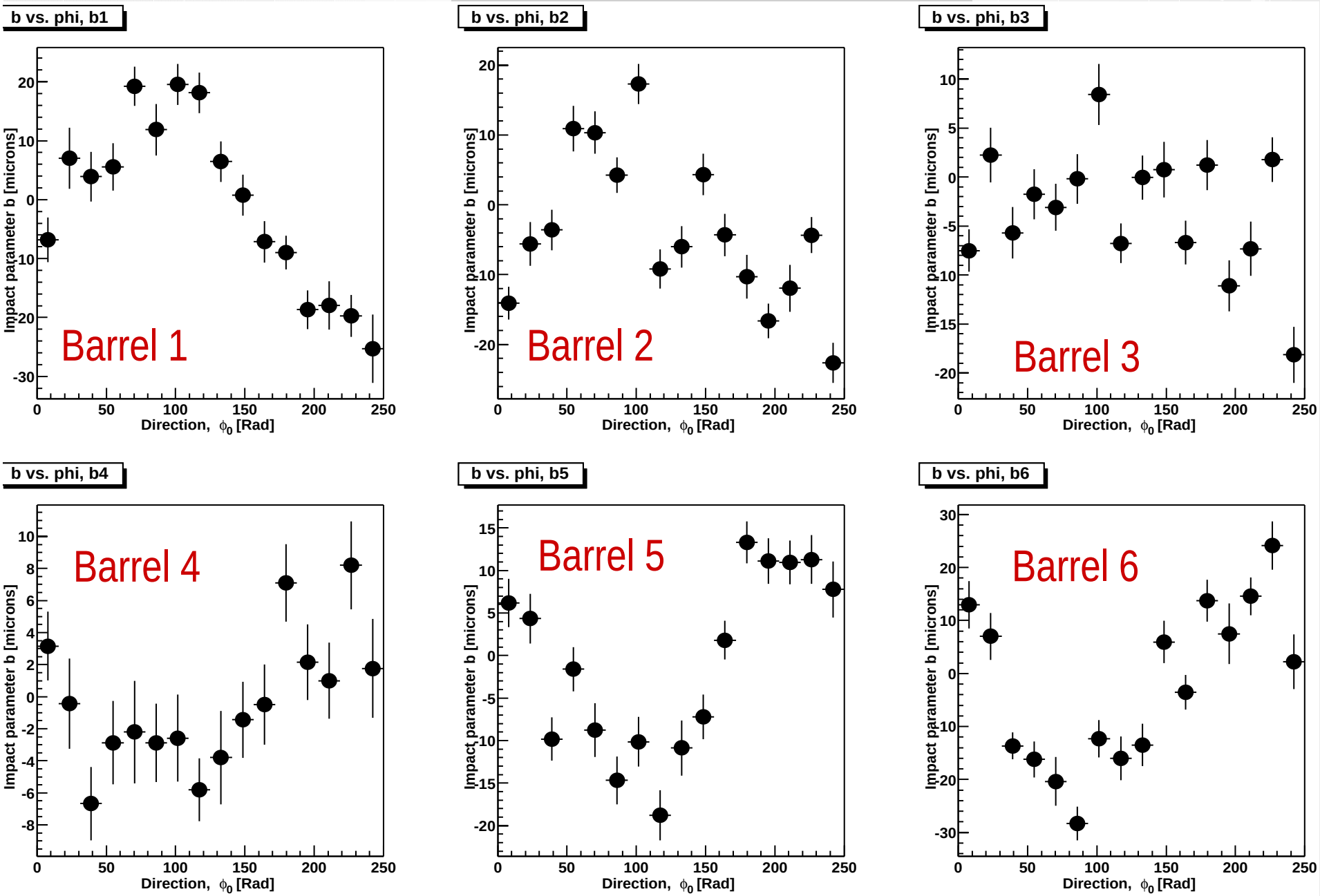
Beam Spot Correction

- Correction is now implemented in integer arithmetic in the DSP code

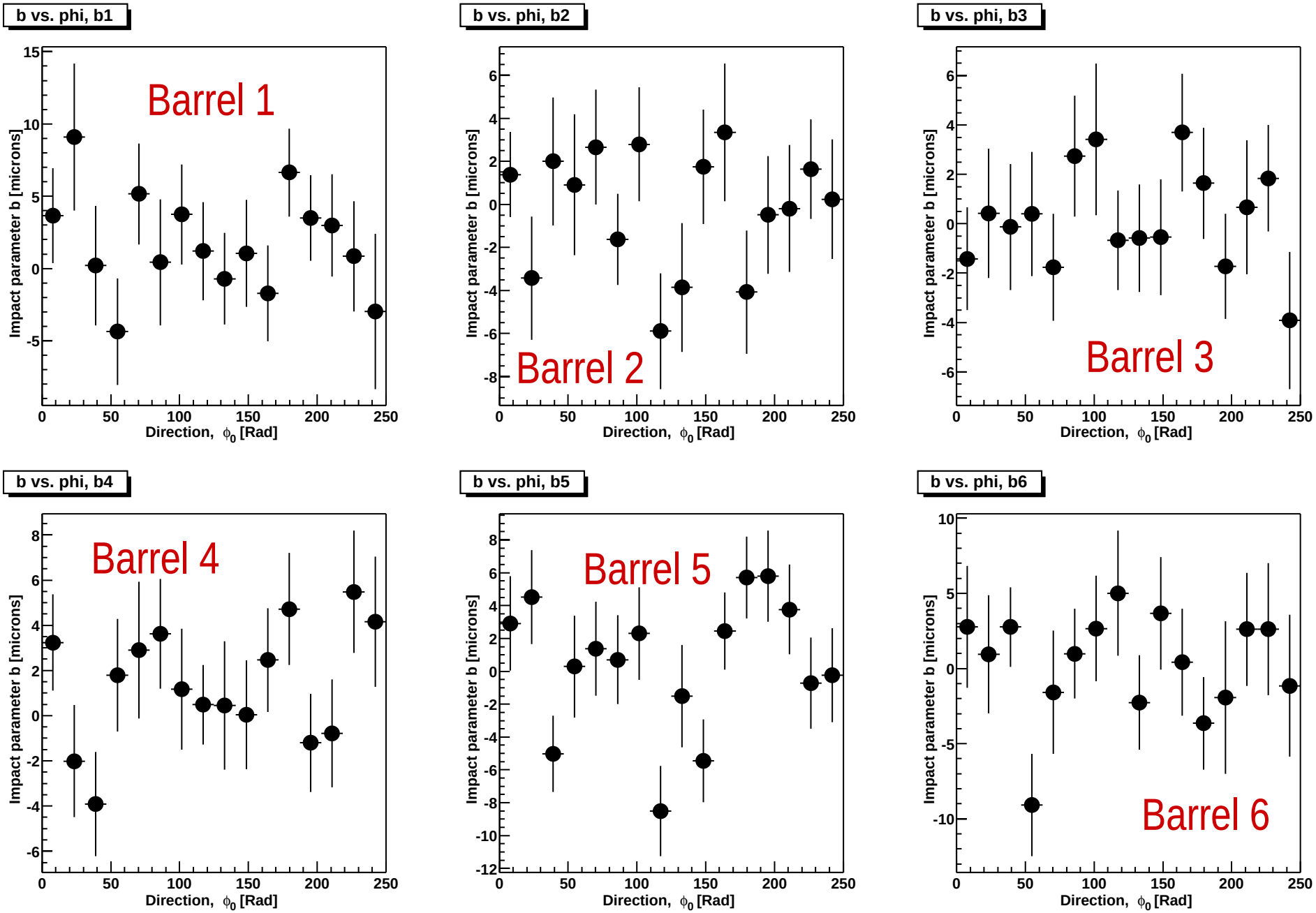
$$b_{corr} = r_b \times \sin(\phi_b - \phi_0)$$

- sin function is provided via lookup table
- Tested in tsim_l2stt (see plots)
- Tested on the TFC using test vectors from from 50 μrad beam tilt single muon file
  - TFC output agrees with TFC test vector file produced by tsim_l2stt

No Beam Spot Correction



Beam Spot Correction Applied



Impact Parameter Significance

- Impact parameter uncertainty has been packed into the P_T bin lookup table since both quantities are extracted from curvature κ
- A new lookup table computes the impact parameter significance
- Index is obtained from packing the impact parameter and the uncertainty in a single 32-bit word
- Output is an 8-bit word (precision/space compromise)
- 8 bit words are packed into 32 bits in the hex lookup table file for downloading to the DSP
- Significance is now filled in the TFC output words and is available in the STT root-tuple