LHCb note 2005-xxx

Noise predictions for the TT production ladders

Addendum to LHCb note 2005-029

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Abstract: An attempt is made to predict the thermal noise for the silicon strip production ladders fot the LHCb TT station, using the method described in LHCb note 2005-029.

Parameters used:

$V_{fs} = 400mV$

Temperature of Beetle: 52 Celsius

Temperature of Ladder: 27 Celsius

electrical parameters as in table 2 of note 2005-029.

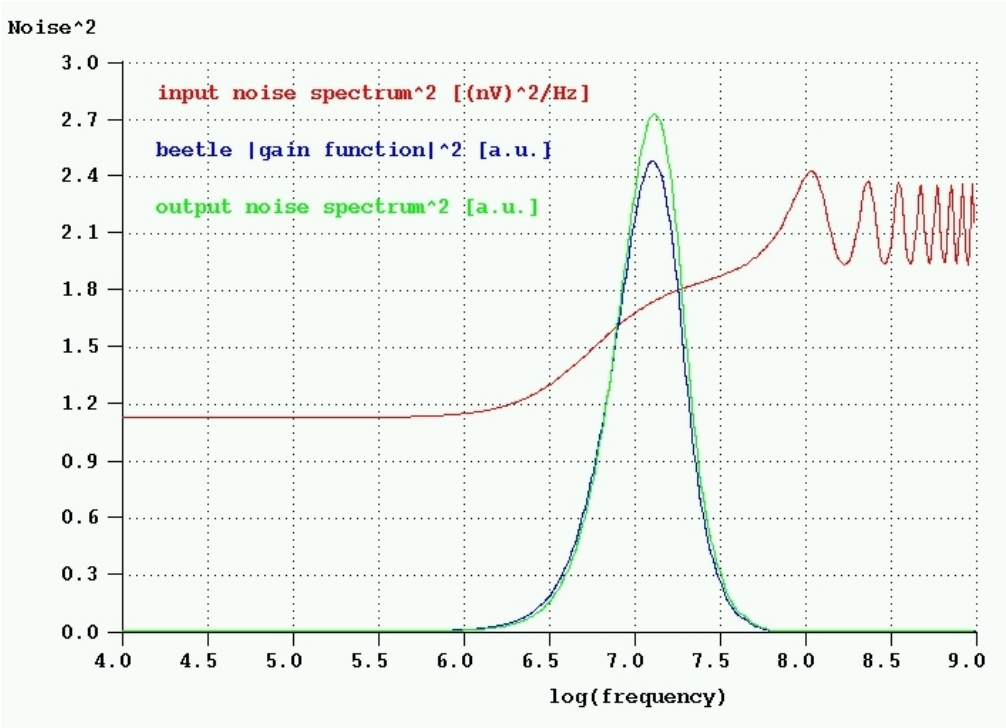

Figure 1: *The noise spectrum squared (red) at the input of the amplifier, generated by the input FET of the Beetle and by the resistance of the sensor readout strips for a ladder consisting of 4 CMS OB-2 sensors. The squared amplitude function (blue) of the Beetle is also shown, as well as the product (green) of the two functions, which represents the predicted Beetle output noise spectrum squared.*

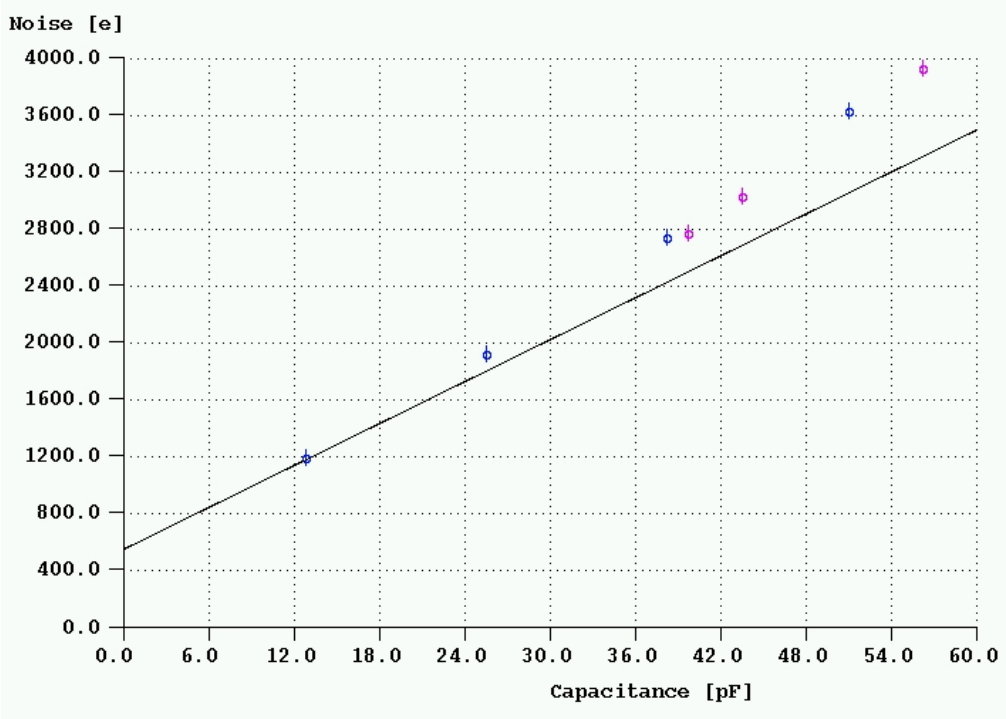

Figure 2: *The predicted equivalent noise charge (ENC) as a function of the detector capacitance. The line shows the intrinsic Beetle ENC, using the formula* $ENC = 540 + 49.2 \cdot C$. *The blue points show the noise predictions for 1, 2, 3, and 4 sensor long ladders. The purple dots correspond to the readout modules, using capton strip readout cables and 1, 2 or 3 sensors connected to it.*

Ladder type	total C [pF]	noise [ENC]	increase [%]
1 CMS sensor	12.8	1187	1.5
2 CMS sensors	25.5	1914	6.0
3 CMS sensors	38.3	2738	13
4 CMS sensors	51.0	3626	19
1 CMS + 56.4 cm cable	39.8	2765	11
2 CMS + 37.5 cm cable	43.5	3028	13
3 CMS + 37.5 cm cable	56.3	3922	18

Table 1: *Simulated noise configurations and results. The last column shows the increase of the total noise compared to a configuration, where a pure capacitance with the same value is connected directly to the Beetle input.*