Ongoing work on Wind/TNR with kappa distribution

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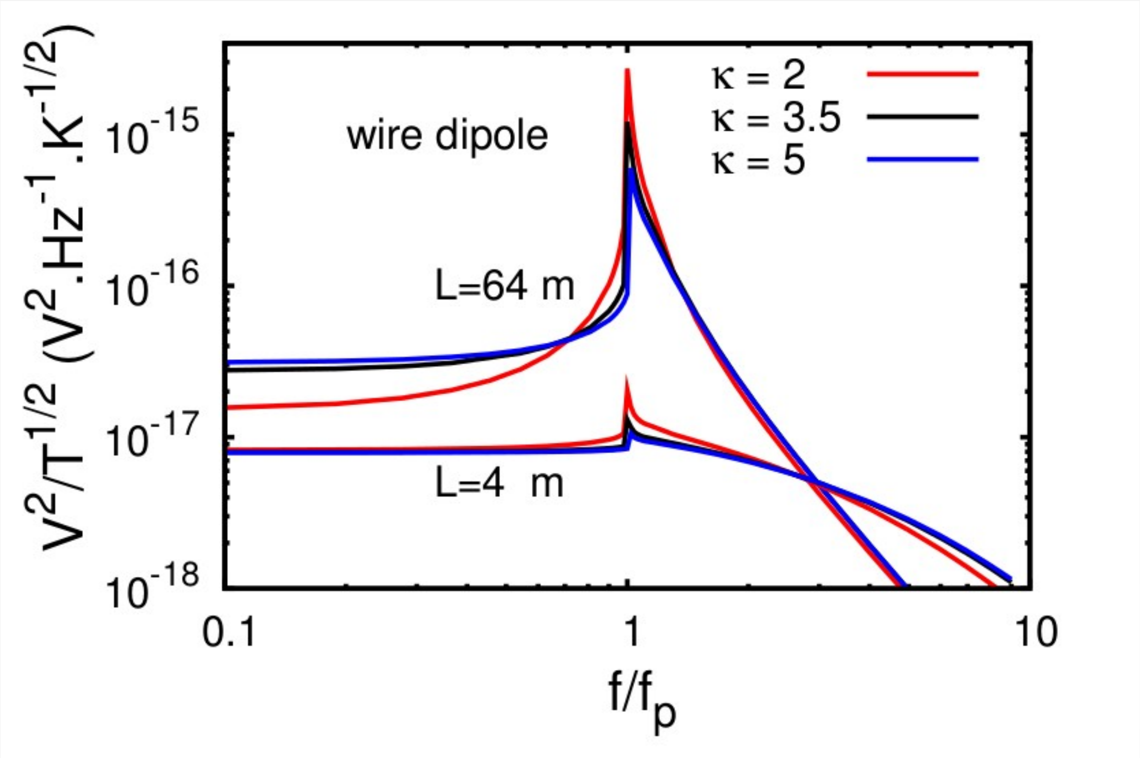
LESIA

QTN with a kappa function



- the smaller κ and the longer the antenna, the higher the resonance peak
- for long antenna, high frequency part **only depends** on n_e and T_e

=> **better T_e measurements**

Le Chat et al., PoP, 2009

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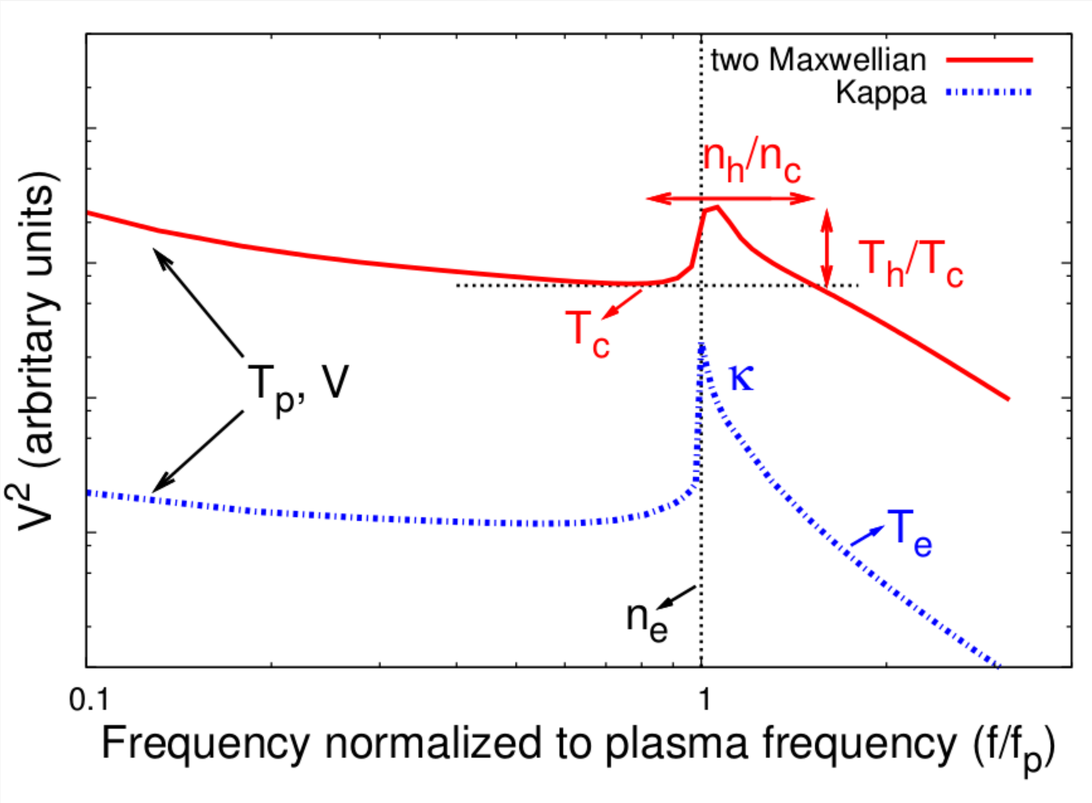
Comparison with sum of Maxwell's distributions

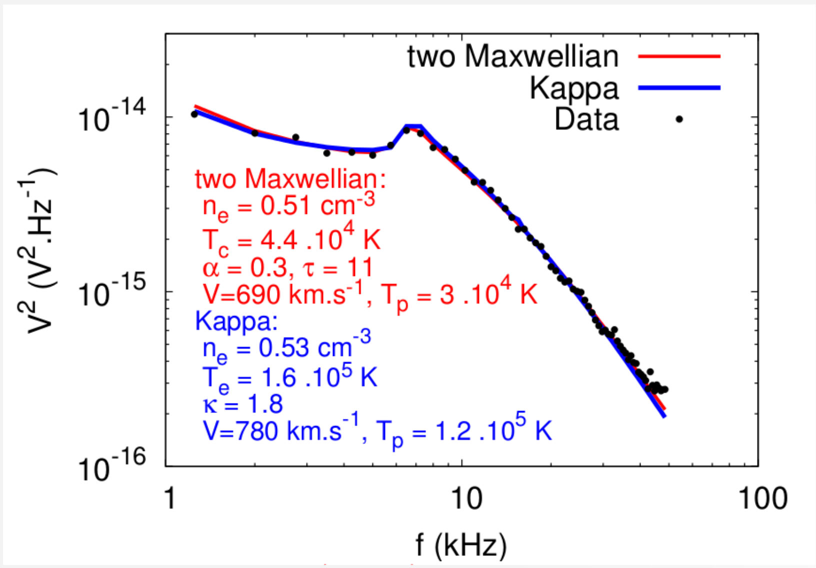


Le Chat et al., SW12, 2010

Comparison with sum of Maxwell's distributions

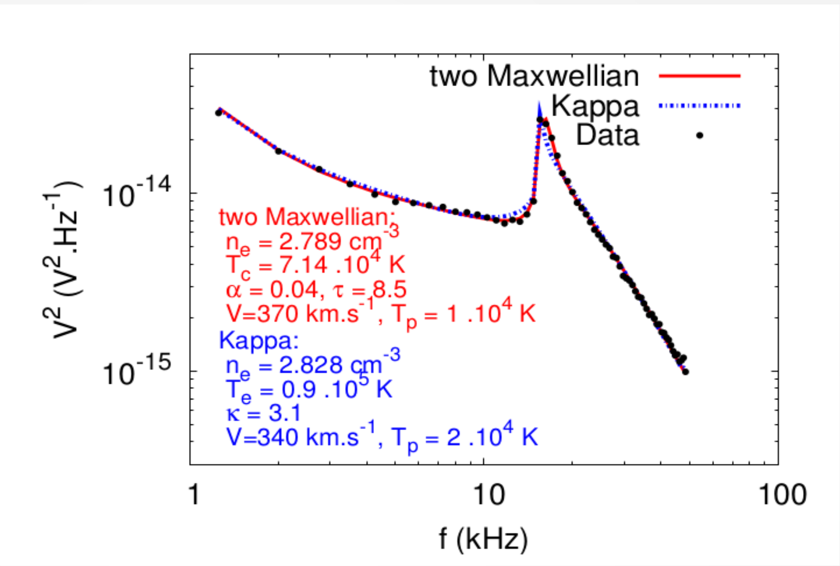
Ulysses/URAP 64 data points:

Fast wind



$$T_{e_{max}} = T_c\left(\frac{1+\alpha\tau}{1+\alpha}\right) = (1.4 \pm 1.1) \times 10^5\text{K}$$
$$T_{e_\kappa} = (1.6 \pm 0.1) \times 10^5\text{K}$$

Slow wind

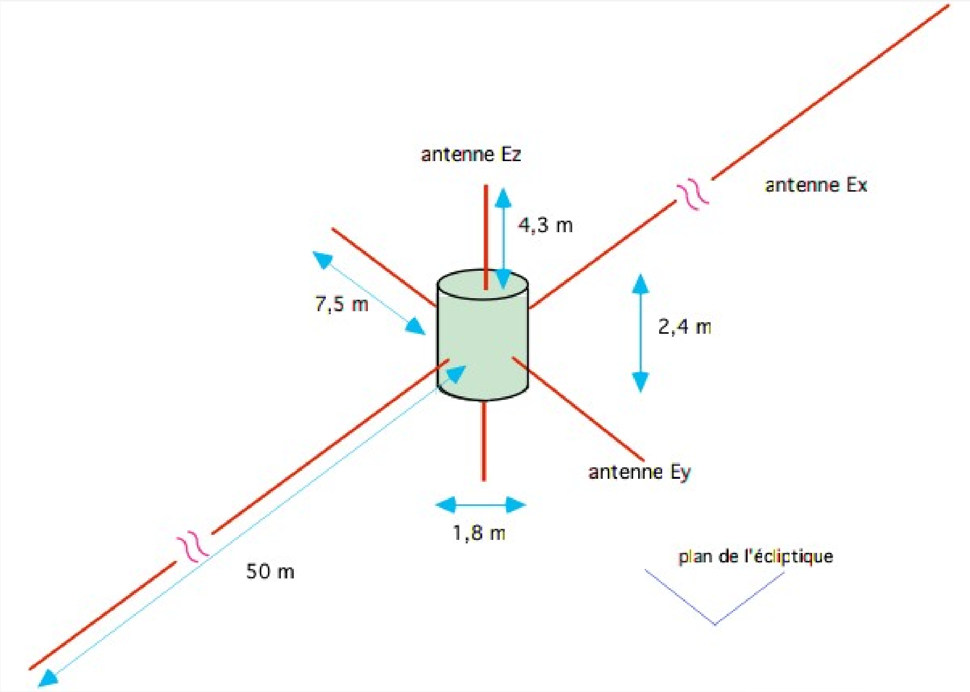


$$T_{e_{max}} = (9.2 \pm 1.2) \times 10^4\text{K}$$
$$T_{e_\kappa} = (9.0 \pm 0.2) \times 10^4\text{K}$$

Much better accuracy for T_e with κ function

Le Chat et al., SW12, 2010

Wind/Waves/TNR data



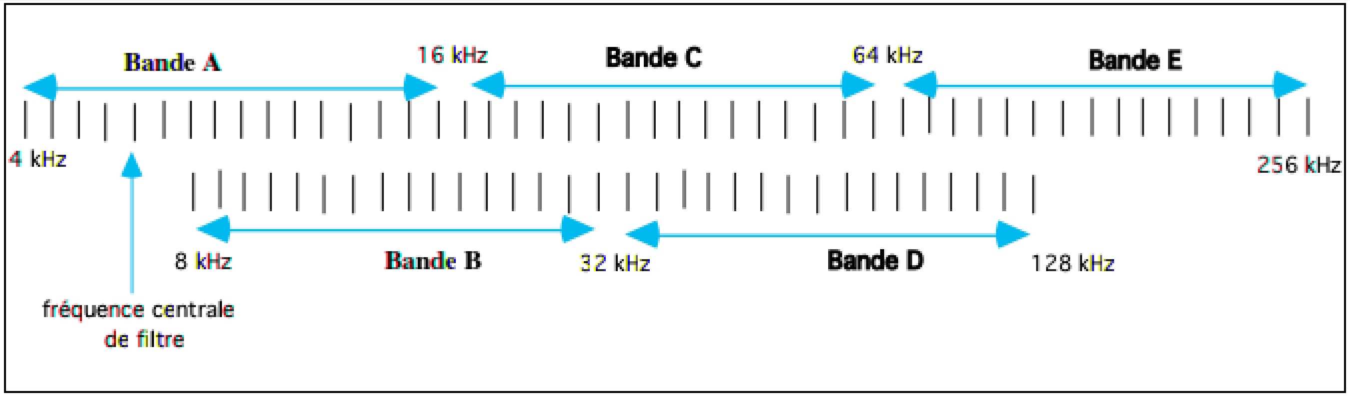
Thermal Noise Receiver:

- 2 analogic receiver (TNR A, TNR B)

	TNRA	TNRB
Combinaison 1	E_x	E_y
Combinaison 2	E_x	E_z
Combinaison 3	E_y	E_x
Combinaison 4	E_y	E_z

- 5 bands of 16 or 32 frequencies in logarithm scale

$$16 \rightarrow f = f_{min} \times 2^{i/8}, 0 \leqslant i \leqslant 16$$
$$32 \rightarrow f = f_{min} \times 2^{i/16}, 0 \leqslant i \leqslant 32$$



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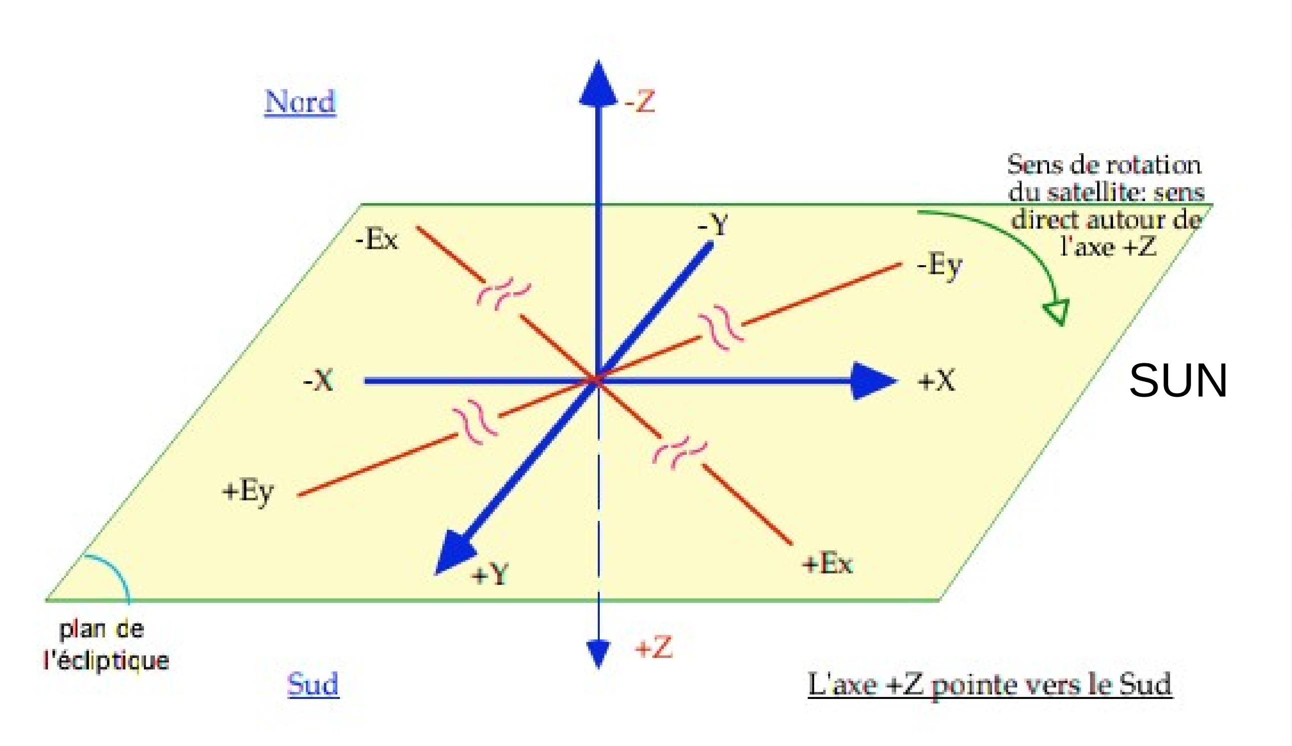
Thermal Noise Receiver:

- bloc acquisition within each band during integration time = 1.472s/n (n = 1,2,4,8)
- usually integration time = 1.472s (Low Bit rate) or 0.736s (High Bit Rate)
- S/C spin = 20 rpm => T ~ 3s



Within the integration time, the angle between Ex antenna and Vsw varies from ~0° to ~90°

Fitting Wind/Waves/TNR data

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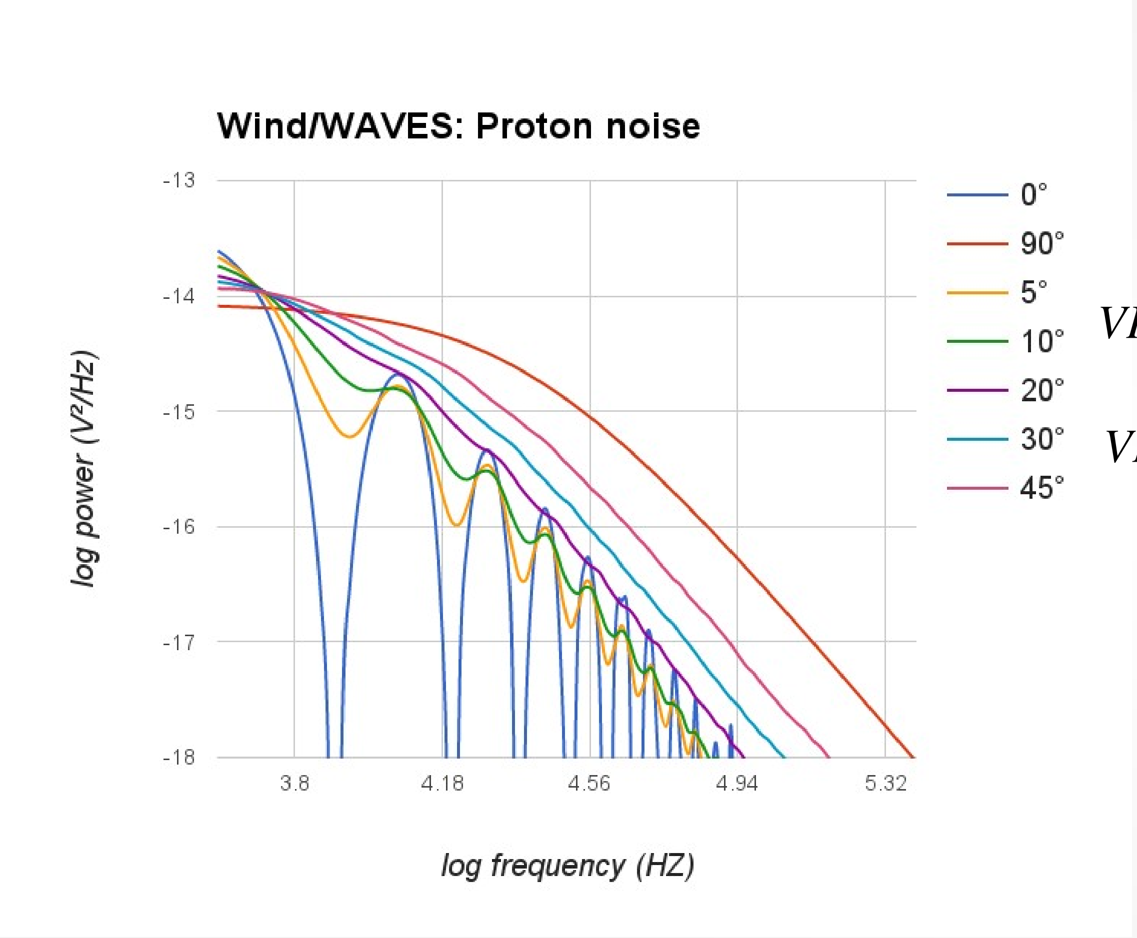

$$VP^2_{wind}(f) = \frac{1}{\Delta t}\int_0^{\Delta t} VP^2(f, \theta(t))\, dt$$

$$VP^2_{wind}(f) \approx VP^2(f, [45° - 90°])$$

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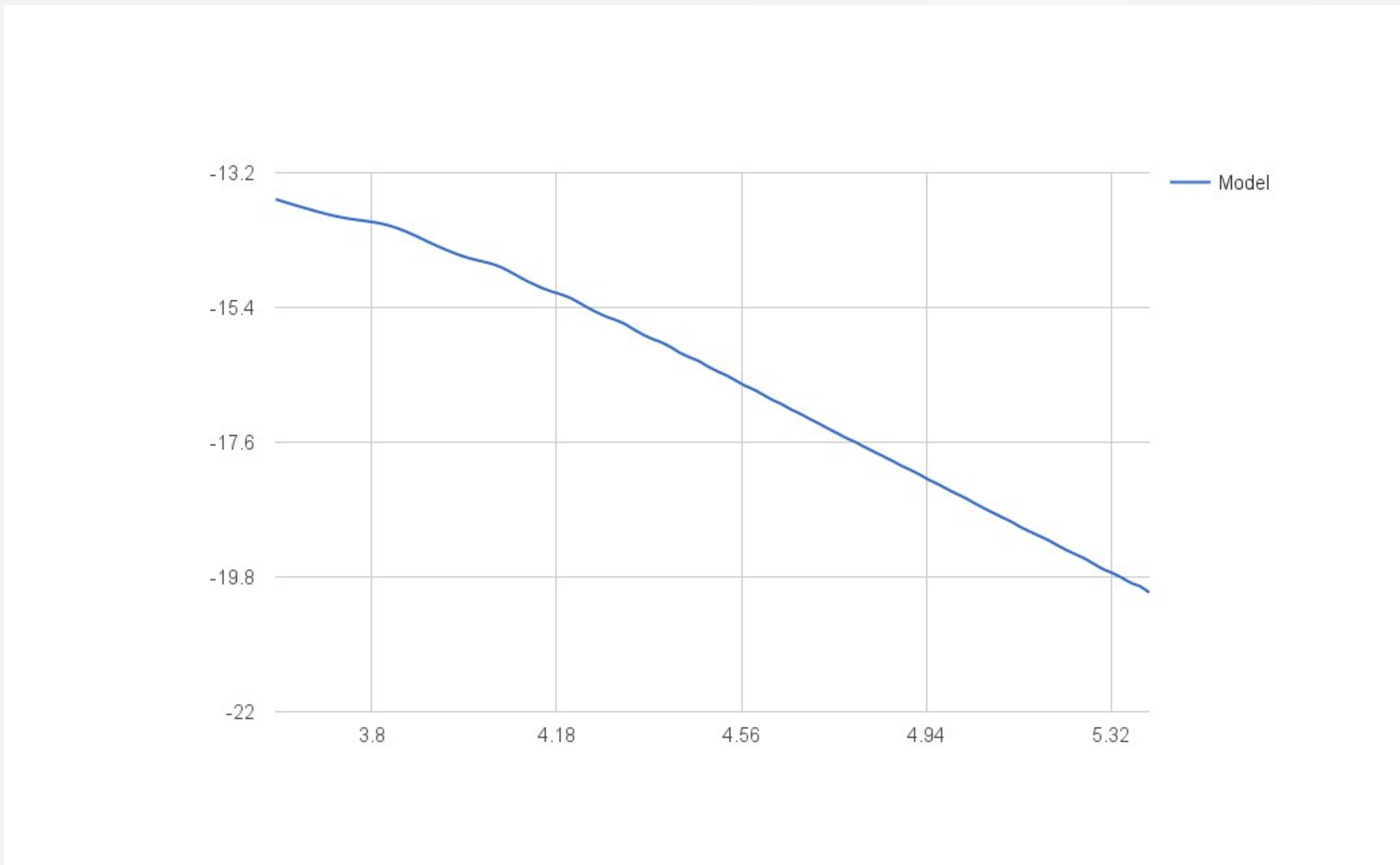

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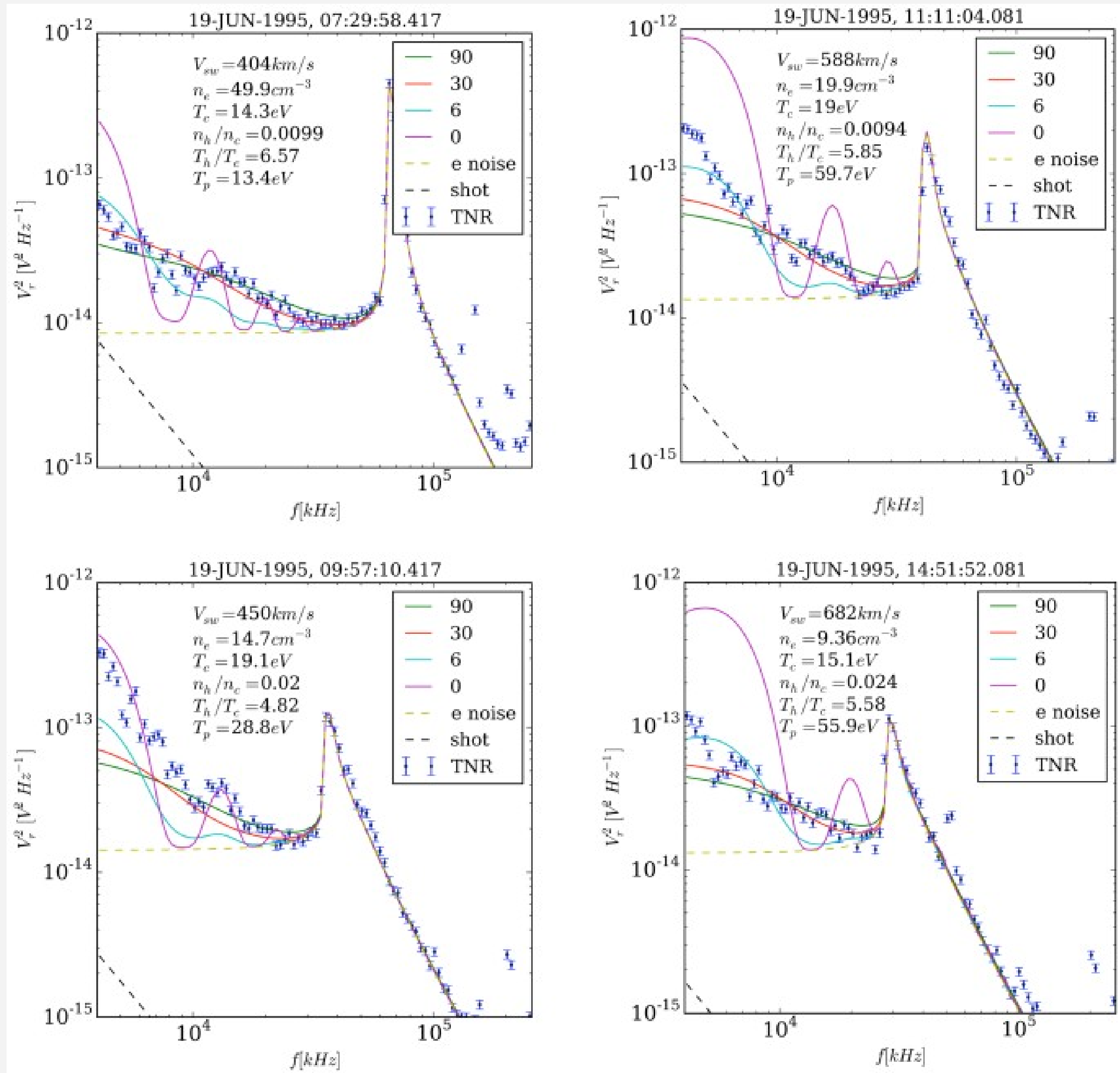

$$VP^2_{wind}(f) \approx VP^2(f, 0°)$$

Exemple

Mon Jun 19 09:57:10 1995