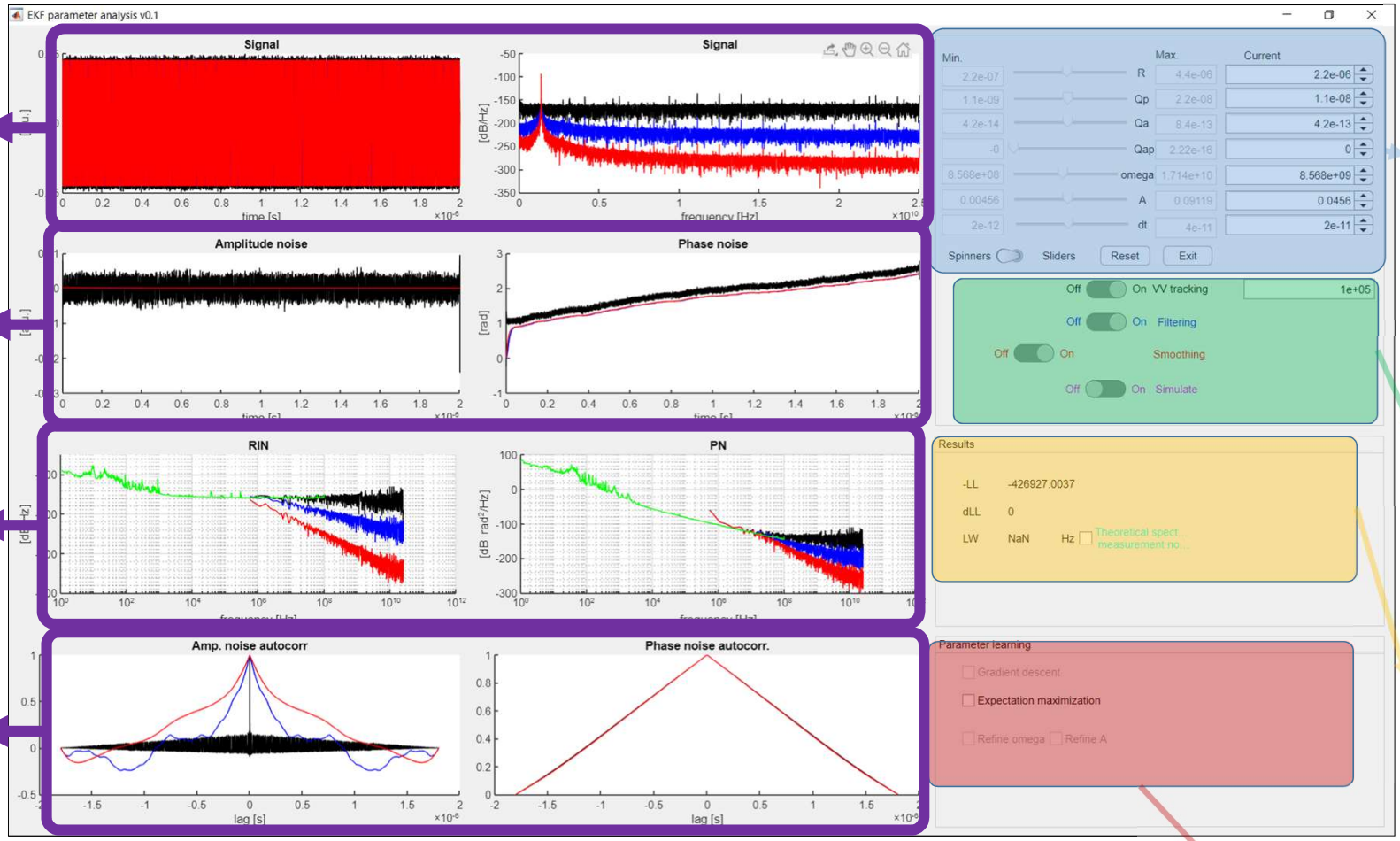
Signal in time (left) and frequency (right)

Amplitude noise in time (left) and phase noise in time (right)

RIN spectra (left) phase noise spectra (right). Green curves are the reference values

Amplitude noise (left) and phase noise (right) normalized autocorrelation



EKF parameters

- R: measurement noise variance
- Qp: phase noise variance
- Qa: amplitude noise variance
- Qap: amplitude-phase noise cross covariance
- Omega: beating frequency
- A : mean amplitude of the signal
- Dt: sampling time

Spinners/sliders: change the paramters, using sliders (left) or spinners (right). The min/max values on the slider's side defines the slider range.

Reset: restore the parameters at their initial value

Exit: terminate the script

Tracking mode

- VV tracking: conventional method (black curves)
- Filtering: EKF (blue curves)
- Smoothing: EKS (red curves)
- Simulate: (magenta curves) simulate amplitude and phase noise as random walk with the parameters defined above

The textbox on the left defines how many samples are used for tracking

Results

- -LL : negative log likelihood. The cost function is normally minimized in state space models
- dLL: Likelihood improvements, from the previous step. A negative value means that the cost function is decreasing.
- LW: estimation of the Lorentzian linewidth from the phase noise variance (parameter above)

The checkbox on the right allows to draw the Lorentzian phase noise and the level of measurement noise, according to the estimate parameters

Parameter learning

Only expectation maximization available. When both filtering and tracking are active. When EM is running, the parameters changes automatically.