

Minimising t_1 noise in 2D experiments

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Where does T1 noise come from?

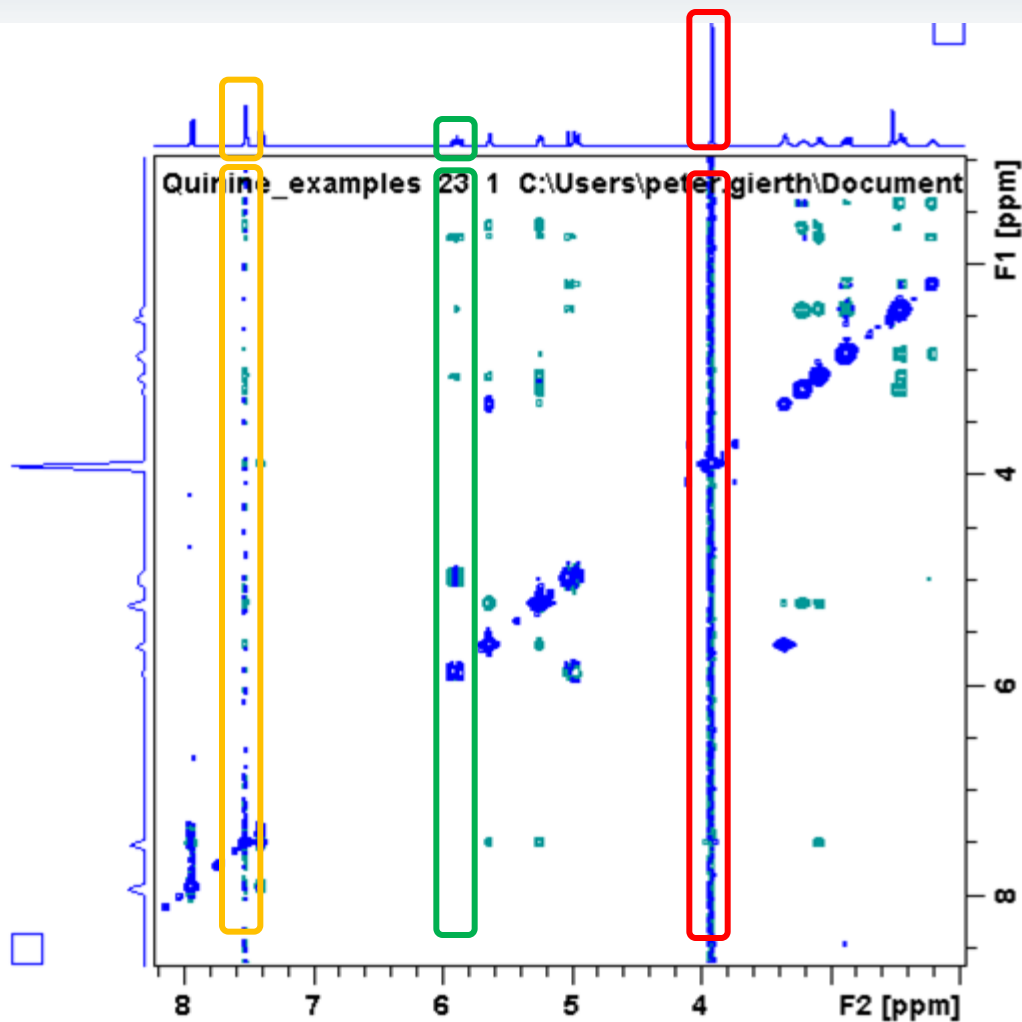


- Irreproducible peak intensity from slice to slice
- Amplitude variation e.g. from pulse amplitude
- Phase variation e.g. from pulse phase
- Peak position variation from field fluctuation

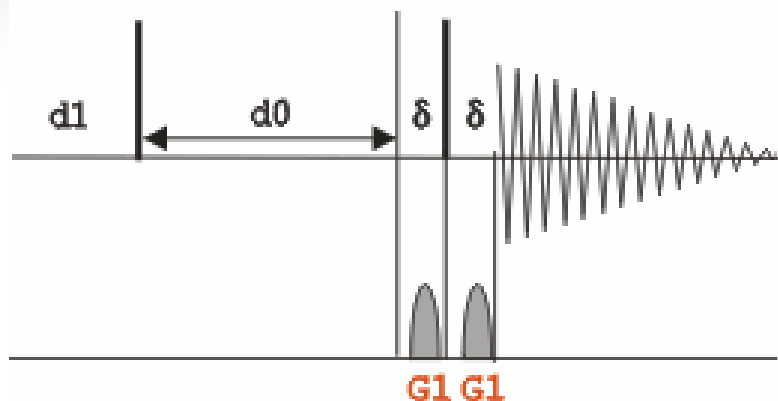
- Magnitude of “noise” depends on magnitude of peak

- In some cases T1 noise comes from imperfectly suppressed signal
 - eg HSQC without gradients
 - eg Magnetization recovery in NOESY mixing time

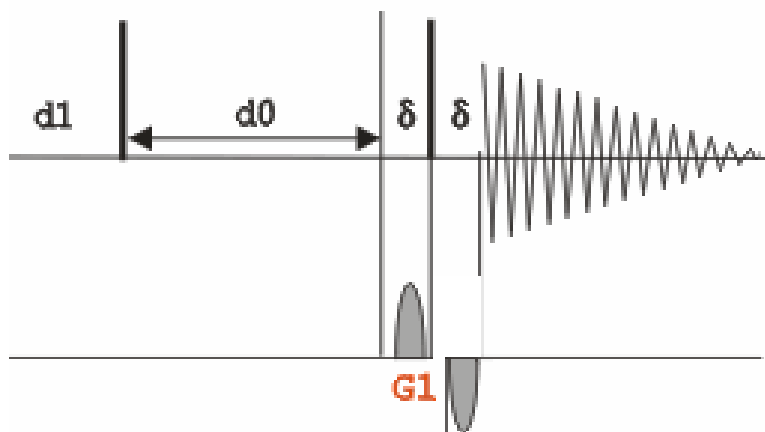
Noise proportional to peak intensity



P- and N- type COSY



- **N-type:**
- **Mixing pulse changes coherence order**
- **Lock dephased**

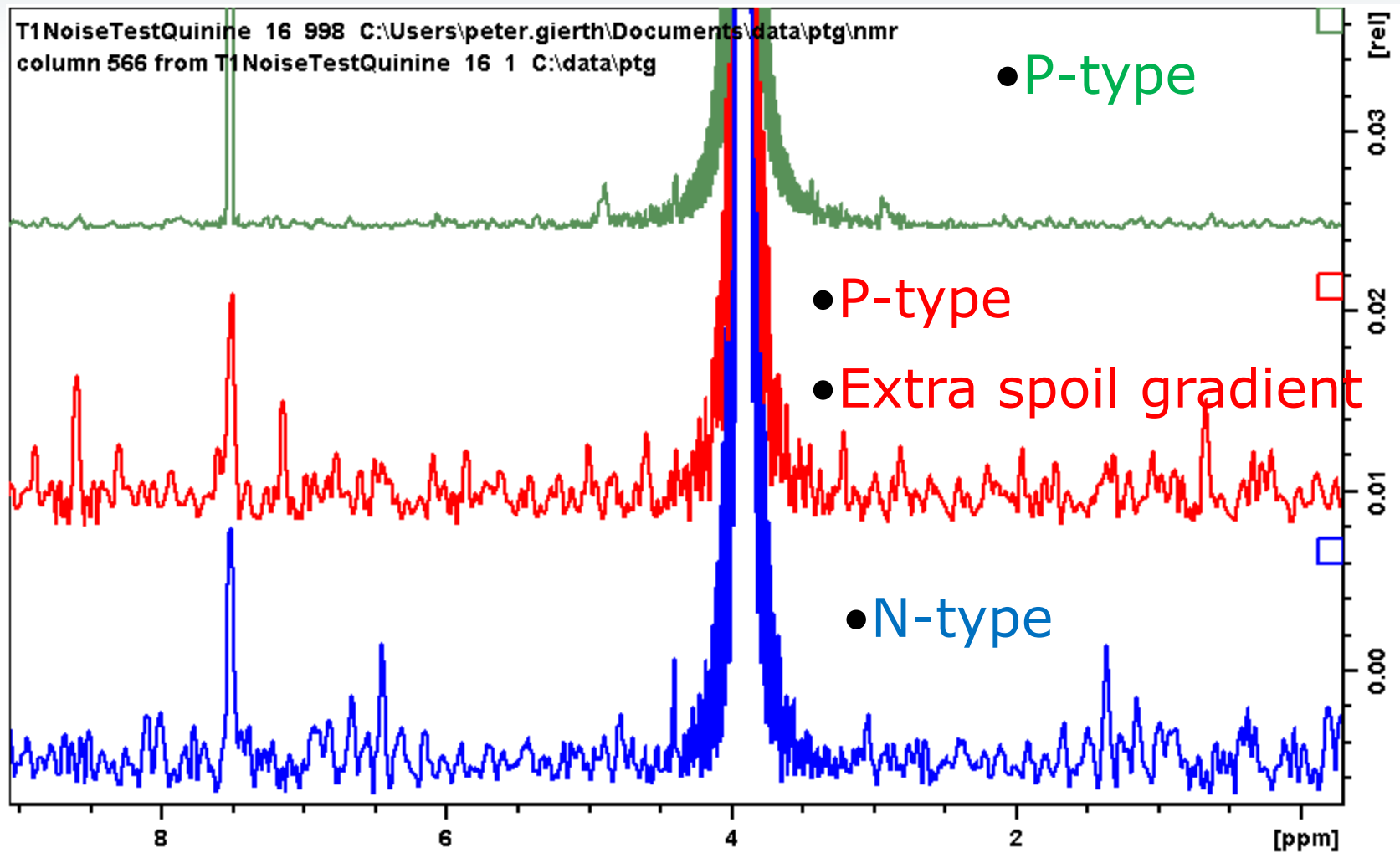


- **P-type:**
- **Mixing pulse no change of coherence order**
- **Lock not dephased**

• To change **cosygpppqf** into P-type: change second gradient pulse to **p16:gpz1*-1**

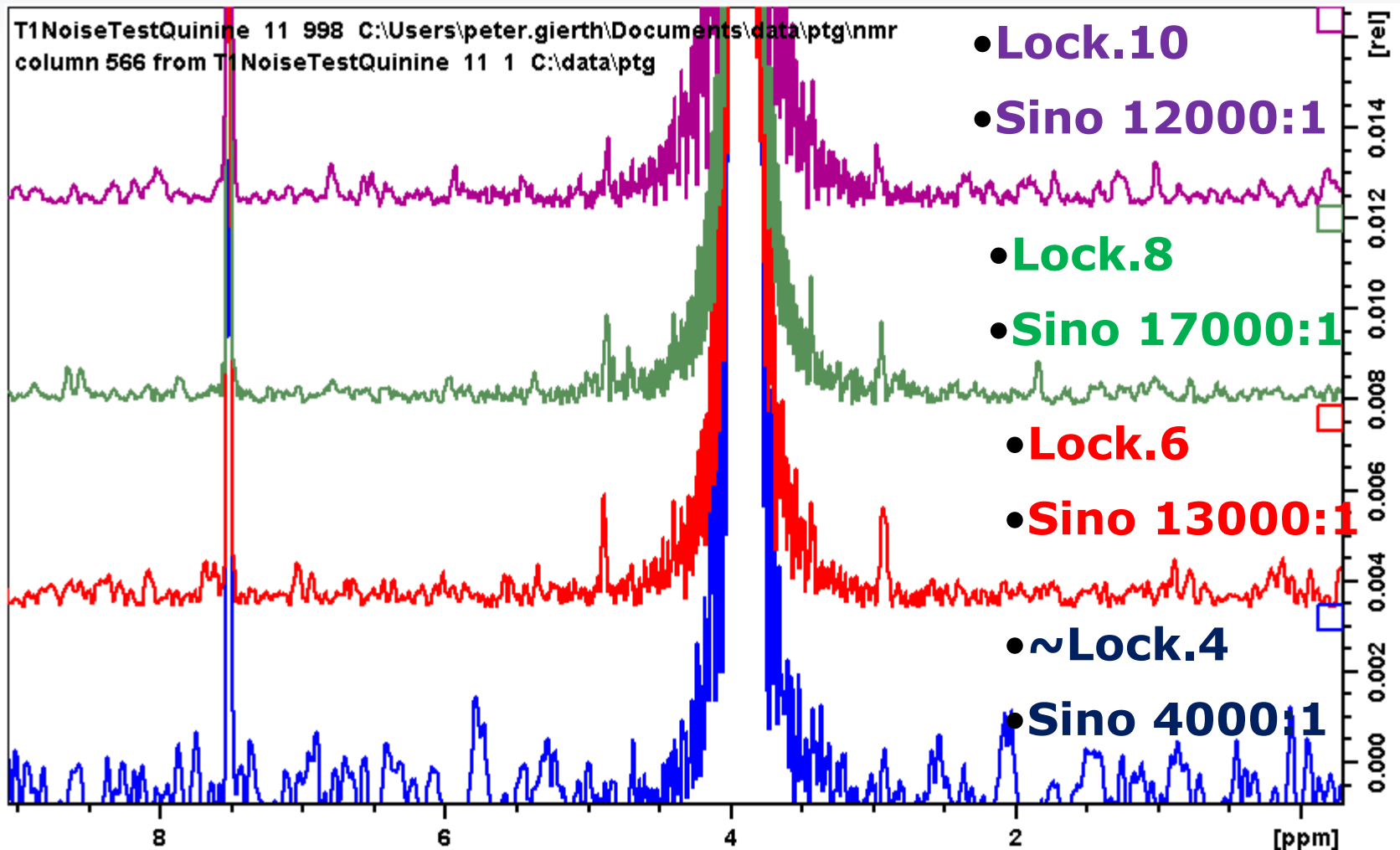
• Processing: **reverse(F1) = true**

Overall performance



Effect of lock settings

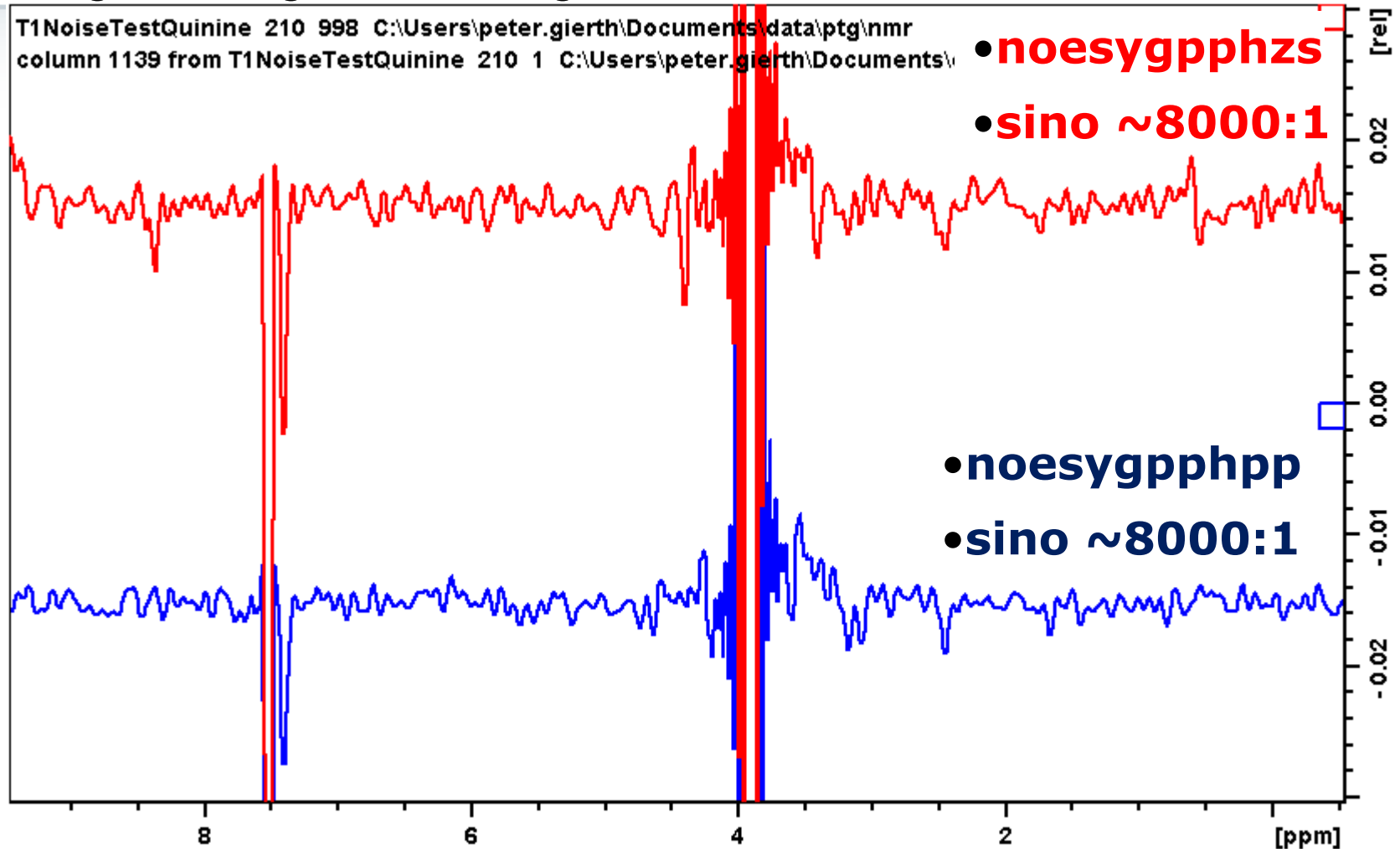
P-type sequence



NOESY

ZQ suppressed vs normal

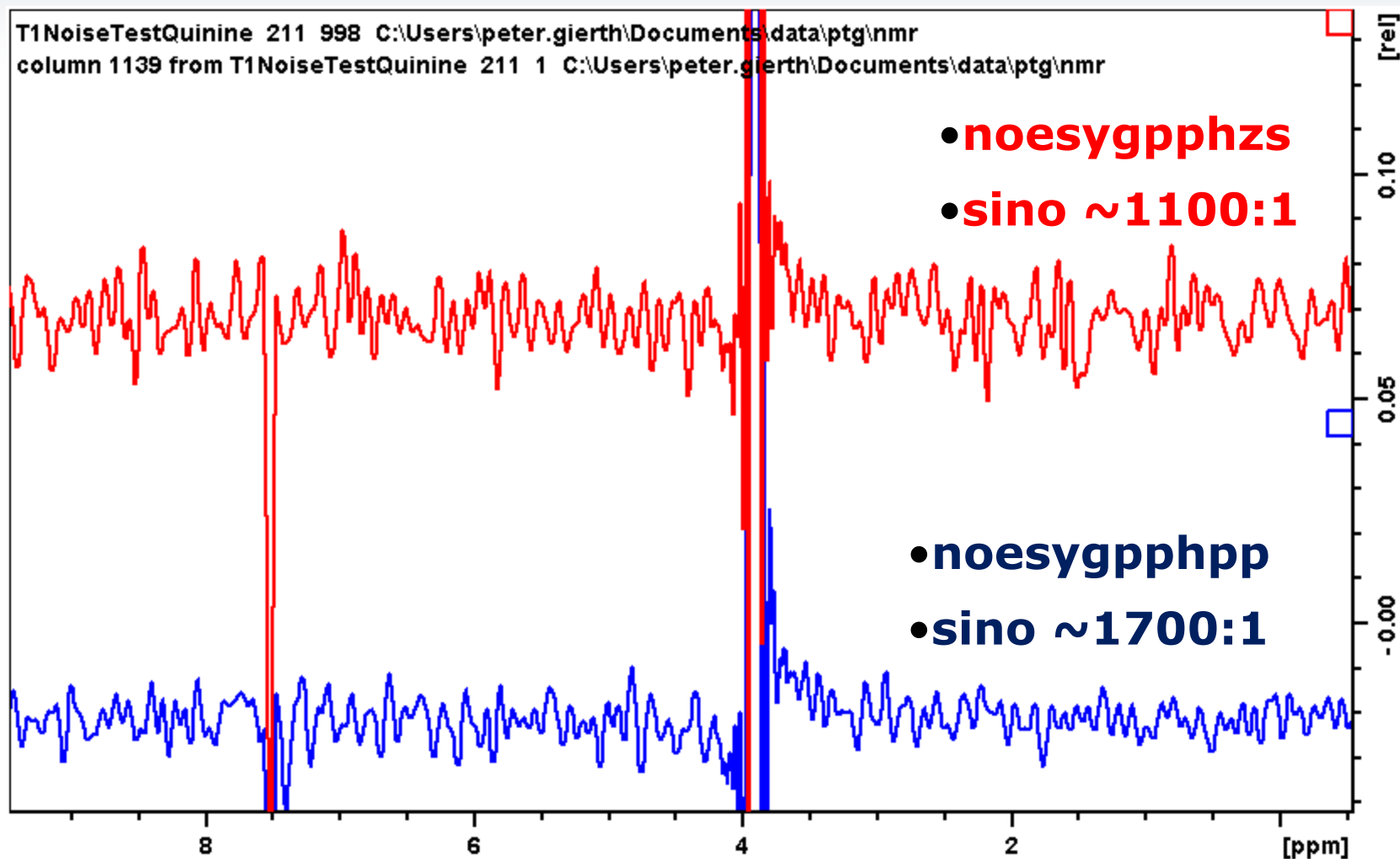
Strong lock signal – lock gain 101



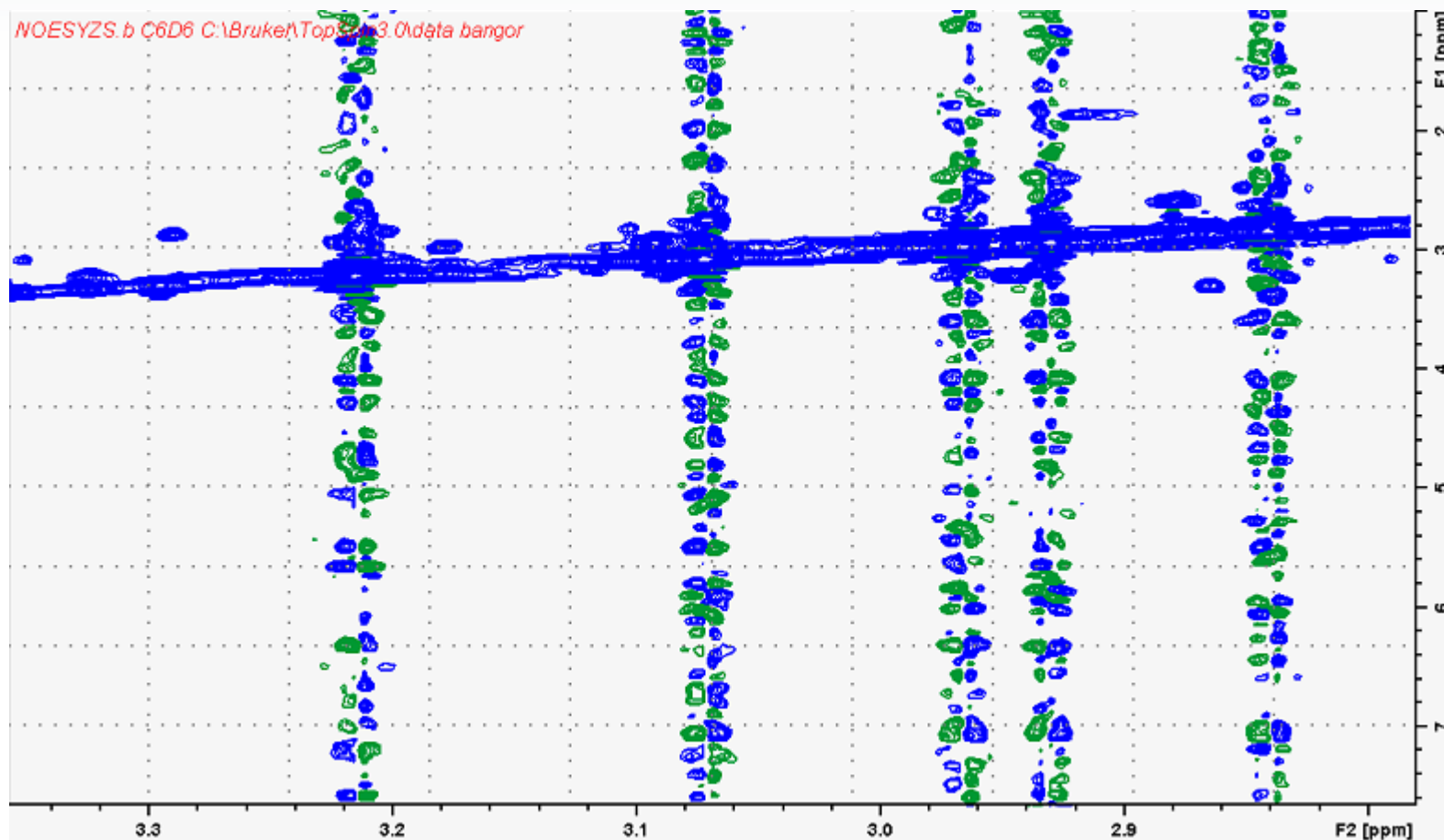
NOESY

Weak lock signal

Lock gain 120



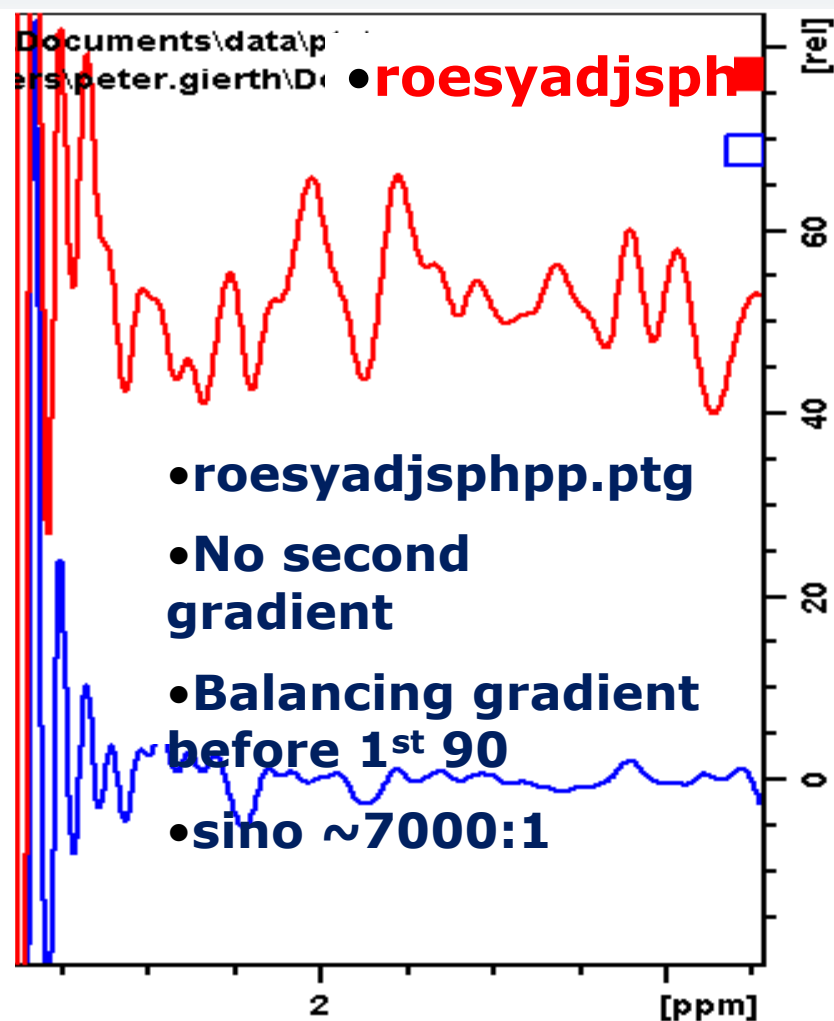
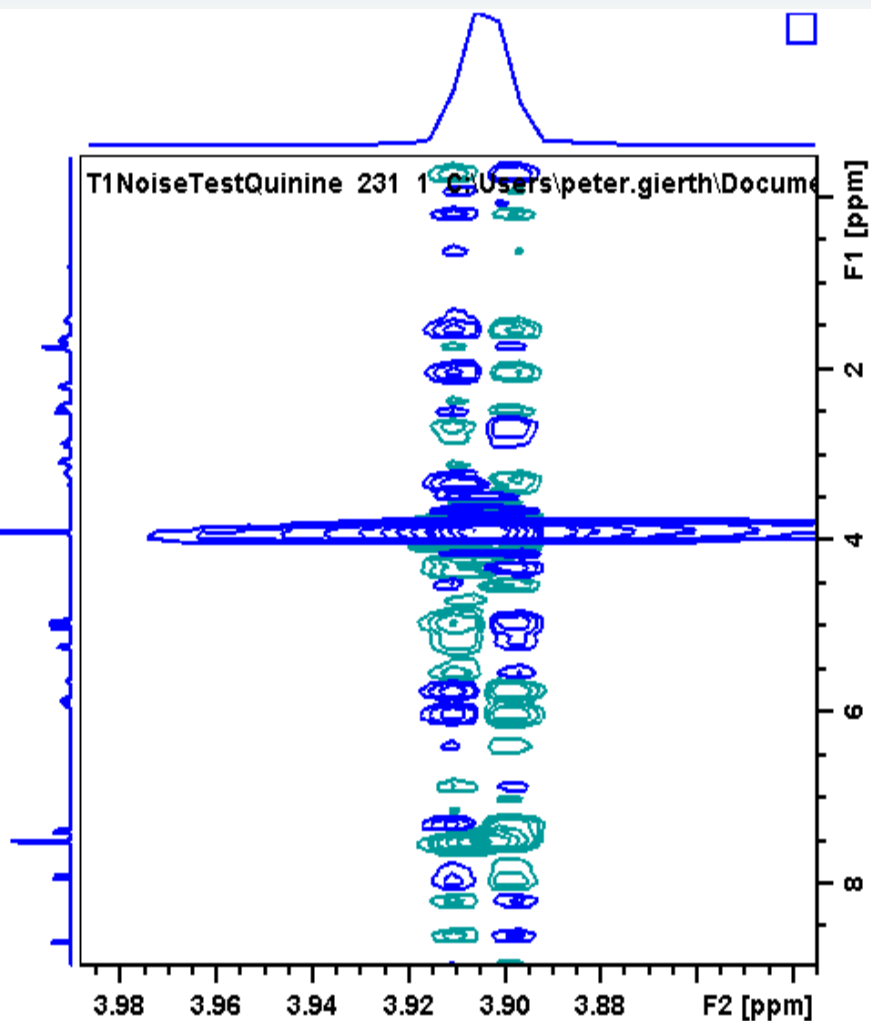
NOESY with ZQ suppression Cyclosporine, SmartProbe



EASY-ROESY

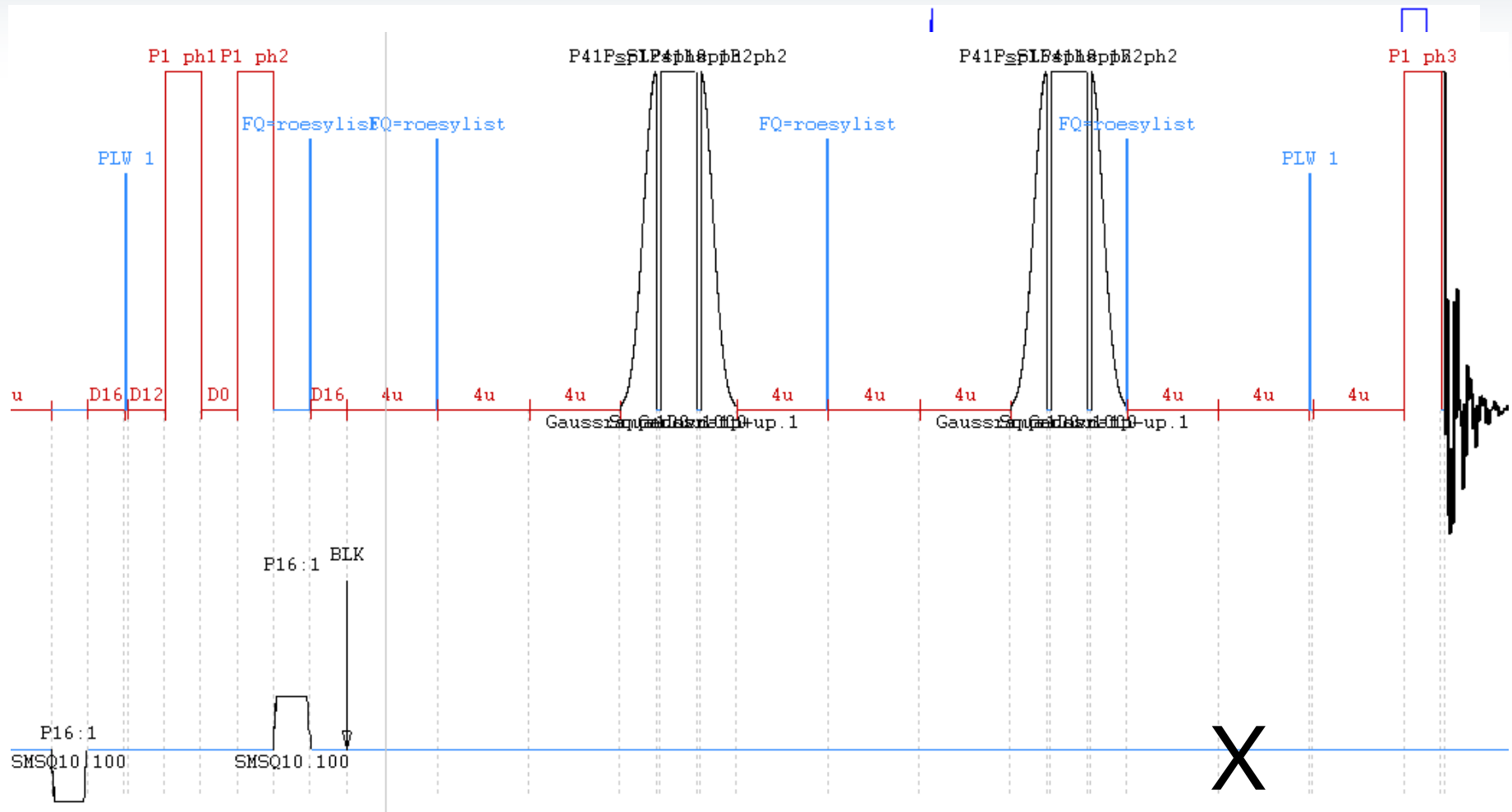
Effect of unbalanced gradients

Long lock-hold duration

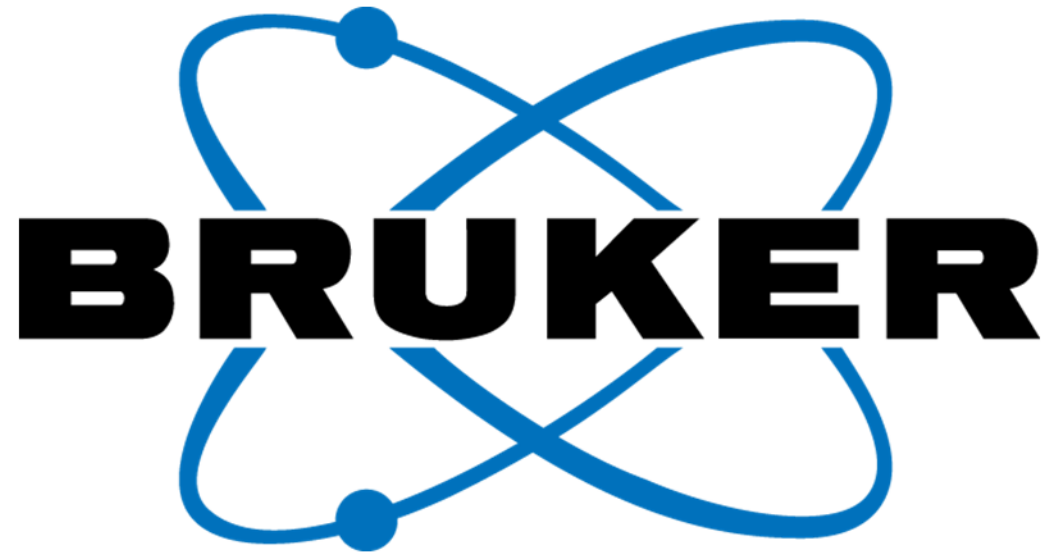


T1 noise

Gradient selected homonuclear 2D
roesyadjsph with modified gradients, ns=4



- Optimum lock power depends on solvent $2H$ T1
- Optimum lock power depends on $2H$ efficiency of probe
- Relationships between powers in edlock are reasonably optimal
- Absolute powers not necessarily so
- => optimise power on e.g. DMSO
- Shift all powers by same number of dB
- Au program "lpopt" – development version available from me
- Loopadj for setting loop parameters/phase
- Lock.x macros for investigating different loop settings



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