**MRI zero**

**11.04.2019**

**Gradmoms form pulseq and simulation now fit perfectly.**

**The last dot in the grads is for some reason necessary in pulseq. The ADC is always one step longer. We still have to understand that.**

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**8.4.2019**

* **Restliche Sachen sollten nochmal slabselective gemessen werden, evtl mehr stabile exportieren**
* **Evtl gz komplett balancen**
* **Try same sequence in vivo**

**7.4.2019**

**What I found out today:**

* **TR=20 ms sequence works and is a reasonable sequence for optimization (fast enough)**
* **Optimized sequence also yields images … still some artifacts not in agreement with sim, maybe due to 20 ms TR and higher echoes.**
* **Gradient optimization sequence works ok**
* **Gradient and flip optimization works ok and yields funny results with very high SAR**
* **To have most flexible optimization a SAR penalty is needed. Lambda of 0.5-2 might be enough.**
* **Slice selection works for target as well as for optimization**
* **Slice selection actually helps to retrieve the very low signals that were found in the right side of the phantom, this was thus due to B0 artufacts and in slice dephasing, now solved with 5mm slice.**
* **Orientation of phantom in final reco plot is flipped up down I think**

****

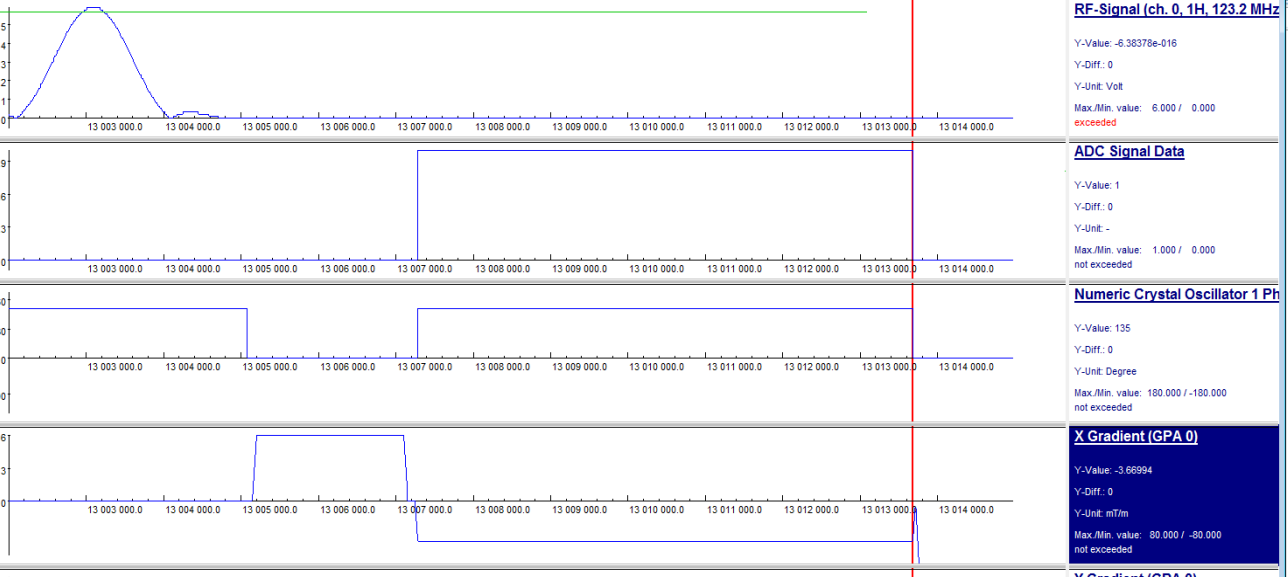
**Optimization without SAR restriction Optimization with SAR restriction**

**6.4.2019 - 1**

**Still struggling with the ADCs and gradmoms**

* Pulseq also has some errors when sending zero grad events. Fucked up some lines in my case.
* we now use the convention that ADC is acquired first.
* Pulseq still requires a full gradient until the end of the sampling ( so 16 gradient steps for 16 resolution) not only 15
* Thus in the sequence files we actually change nothing, also not the ADC mask. The ADC first is in the scanner class, but should be transparent.
* Old all\_iters can still be exported as the sequence definition did not change. Actually only the adjoints needed for the reco will change when used with gradmoms from sim. Gradmoms form pulseq should be as well transparent.

**ADC is always on until the end of the read gradient:**



**03.04.2019**

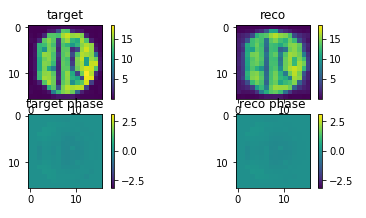
Figures in: seq190402\_\_e06\_tgtGRE\_tsk\_GRE\_no\_grad\_16\_1kspins\_lr0.7\_onlyrewind

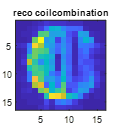
We made the following observation:

The gradient moments seem off for some reason.

Using the adjoint with the gradmoms given in pulseq actually solved the problem

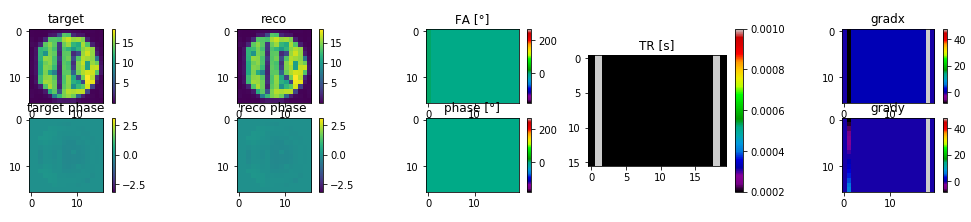
**27.03.2019**



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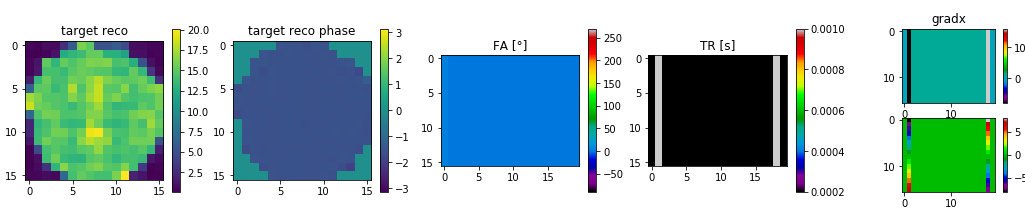
**Left GRE, right lowSAR GRE**

**Numerical phantom added from measured 2D phantom.**

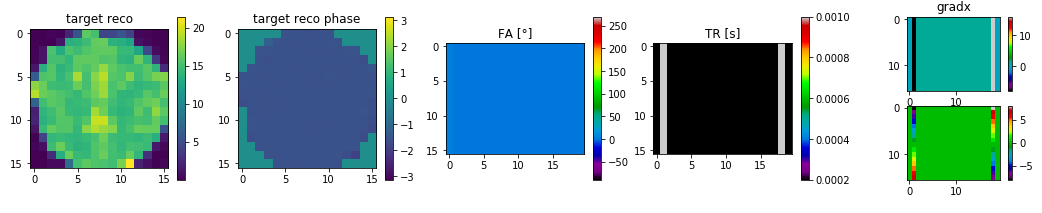


**check for spoiling here: Nspins min 25^2**

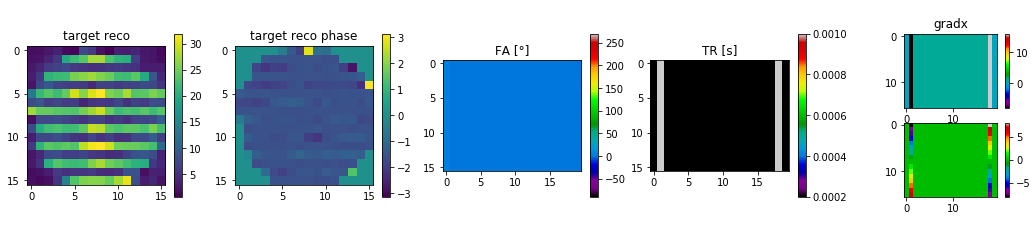
**Div by sz-1**



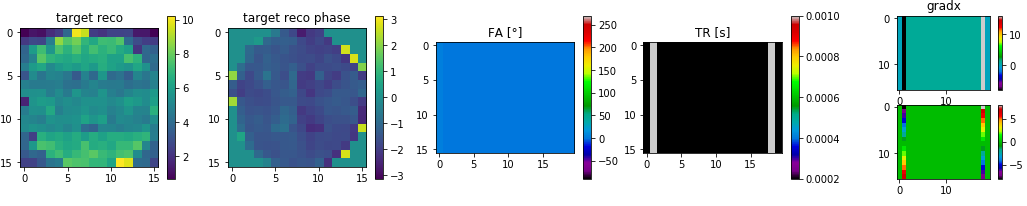
**Div by sz**



**12^2 spins**

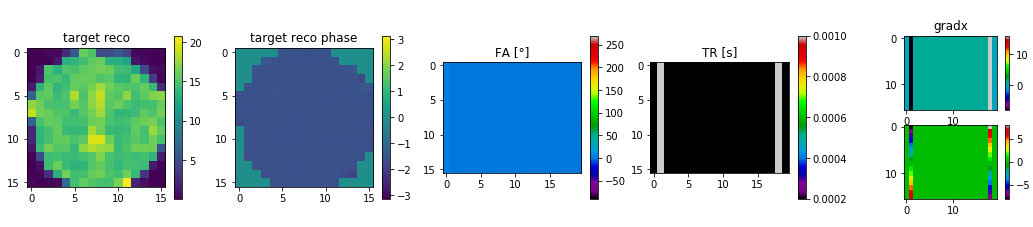


**Spin distribution within voxel, off=0**

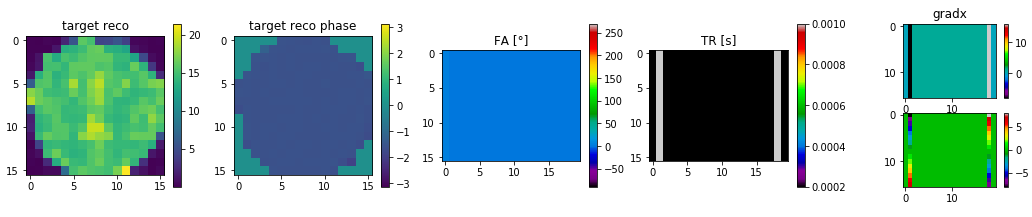


**Spin distribution within voxel, off=1/dim**

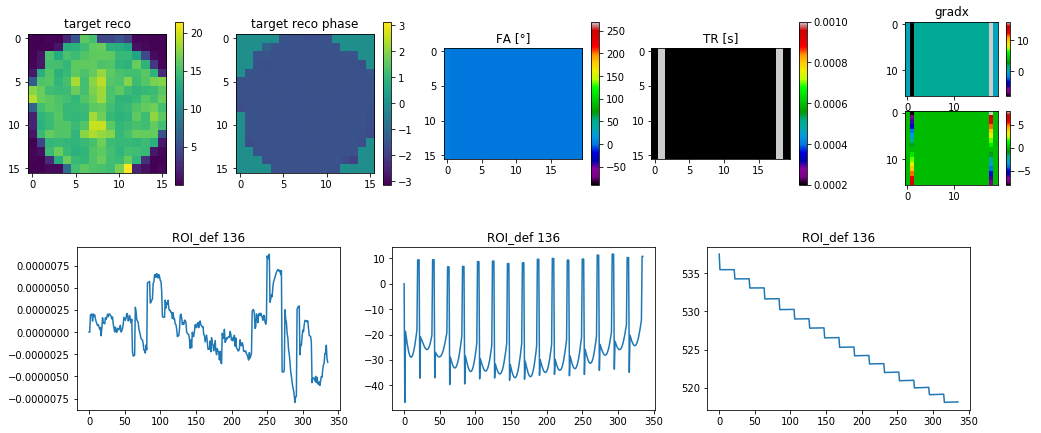
**26^2 spins**



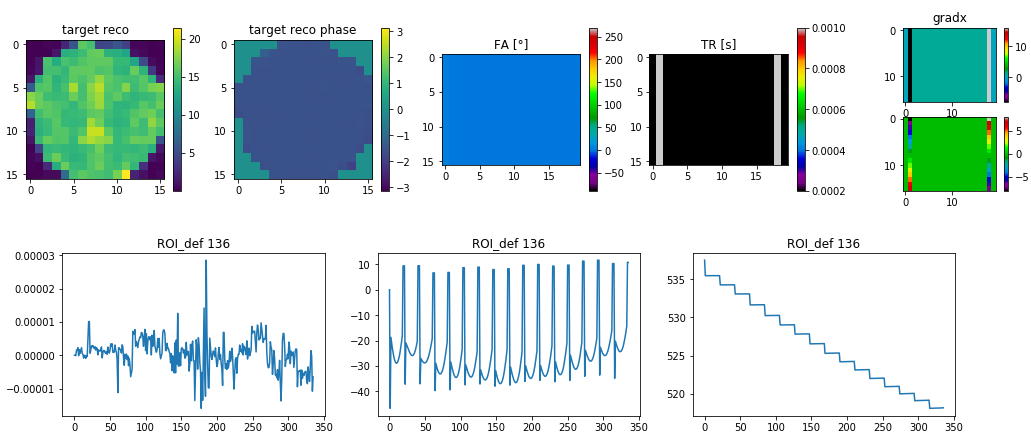
**Spin distribution within voxel, off=0**



**Spin distribution within voxel, off=1/dim**



**Spoiled GRE: With pervec**

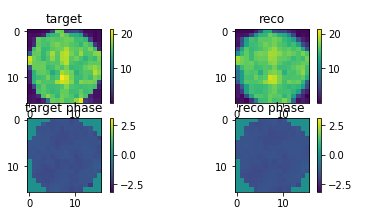


**Spoiled GRE: Without pervec**

**27.03.2019**

**Low SAR GRE optimized**

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**Hooray!**

**26.03.2019**

**Try the following experiments:**

1. spoiled GRE (RF and gradient) x2negy****
2. **spoiled GRE (RF spoiled x2y2**

****

1. unspoiled GRE (Rf spoiled, no gradient)

****

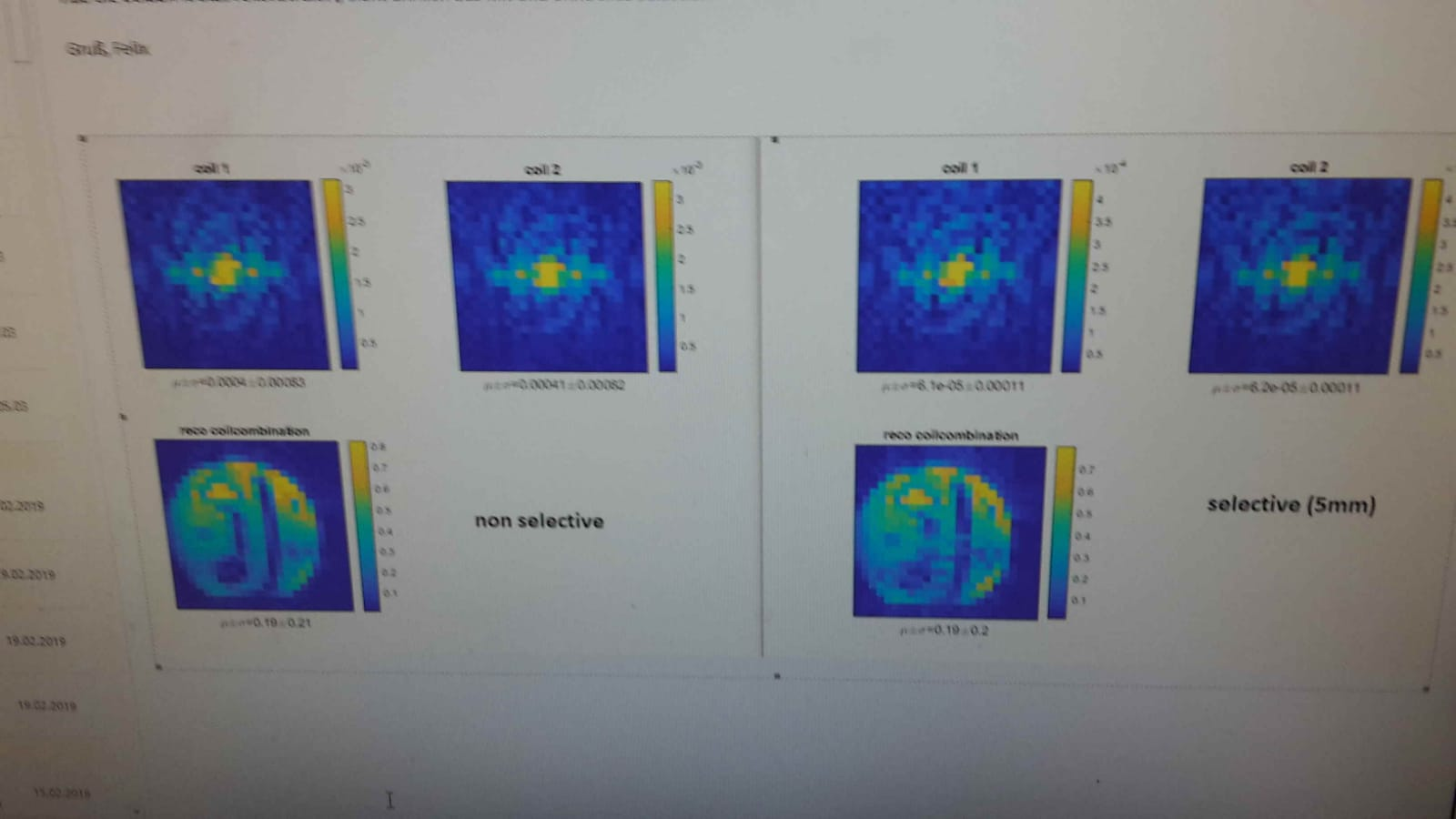
1. **unspoiled (no grad, no RF)**



**25.03.2019**

found problem deep in sumulation: we modeled until now deltafunction, now change to continuum

**11.03.2019 – RARE 2D with spoilers added**



**11.03.2019 – first RARE 2D results – no spoilers**

