

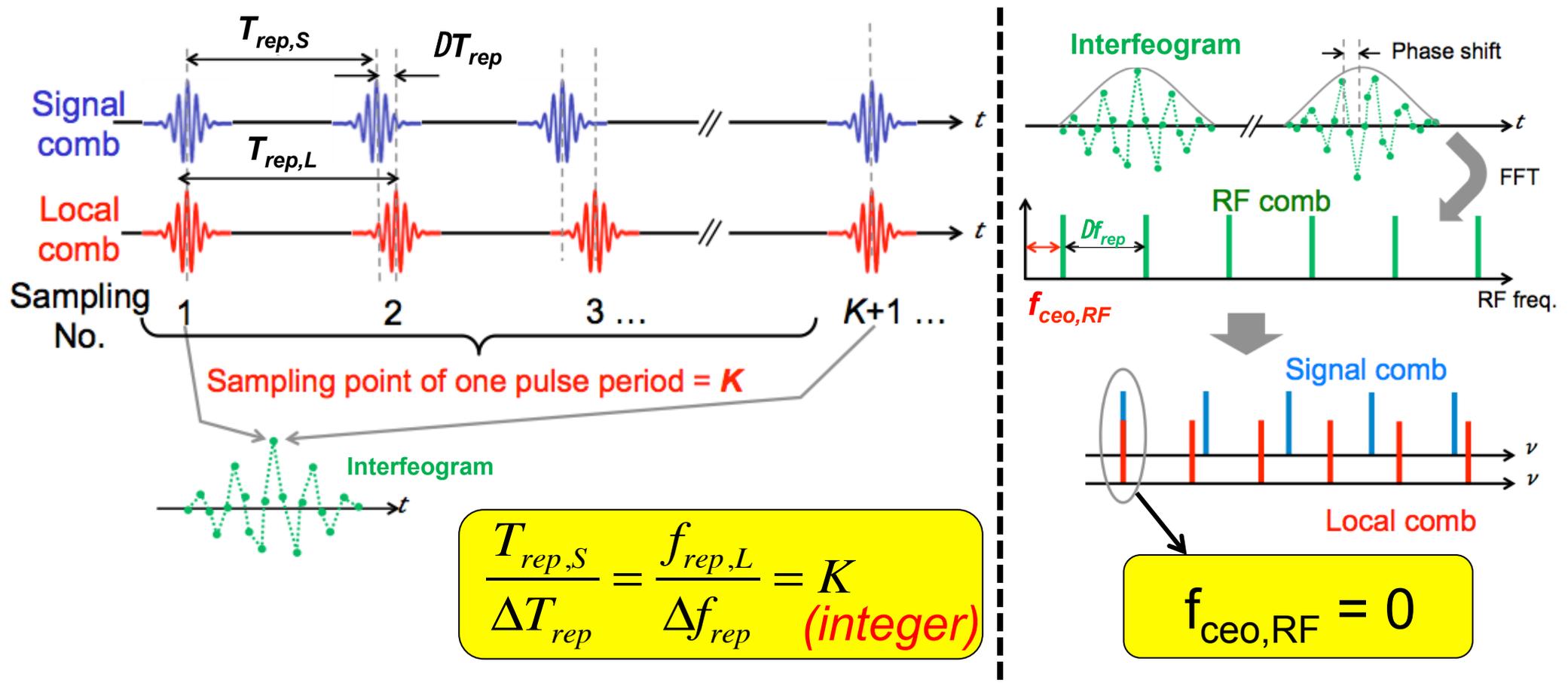
# デュアル光コム分光 エリプソメータの構築

安井研究室  
PD 謝 宜達

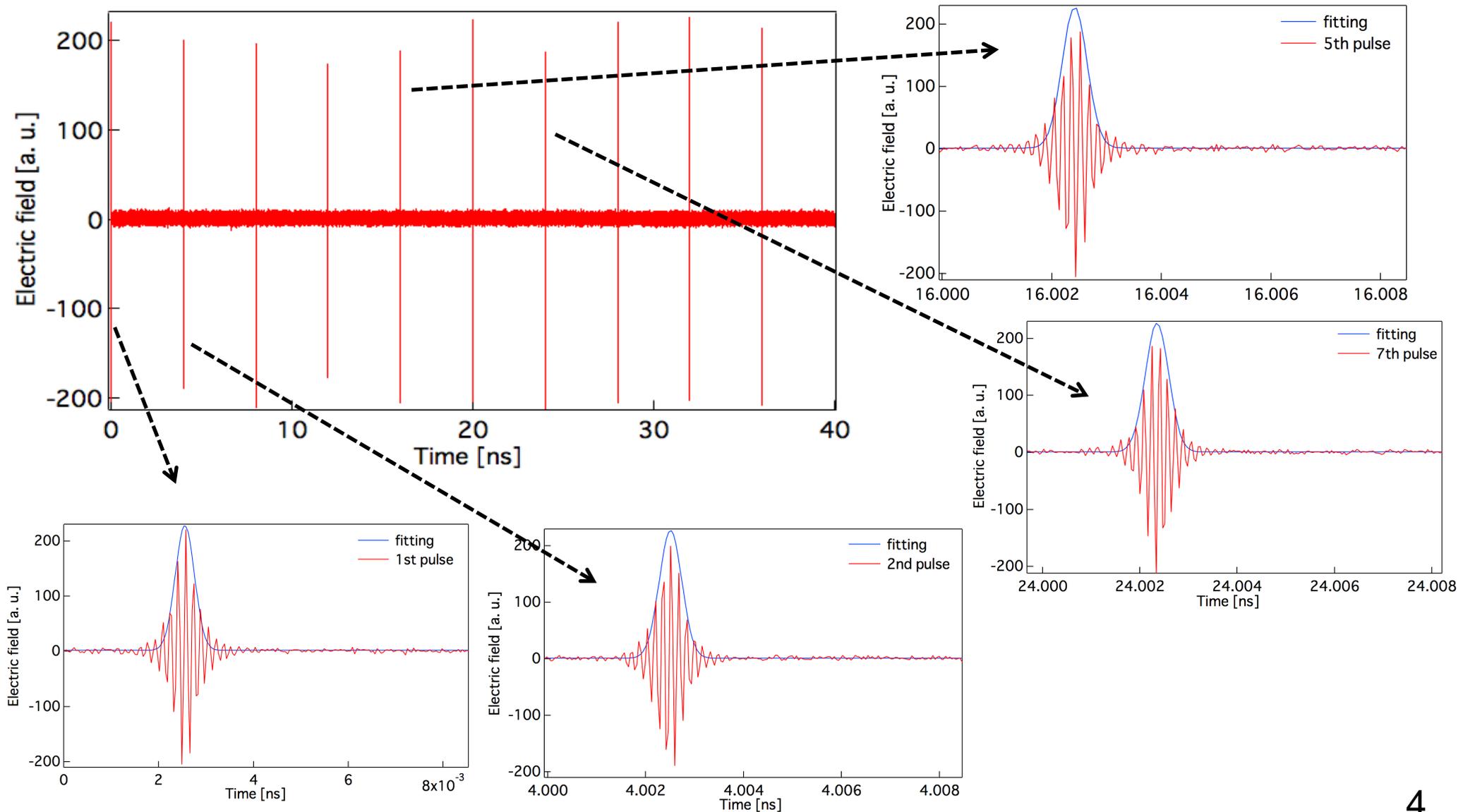
- 実験装置
- サランラップの計測
- QWPの計測

# Coherent averaging

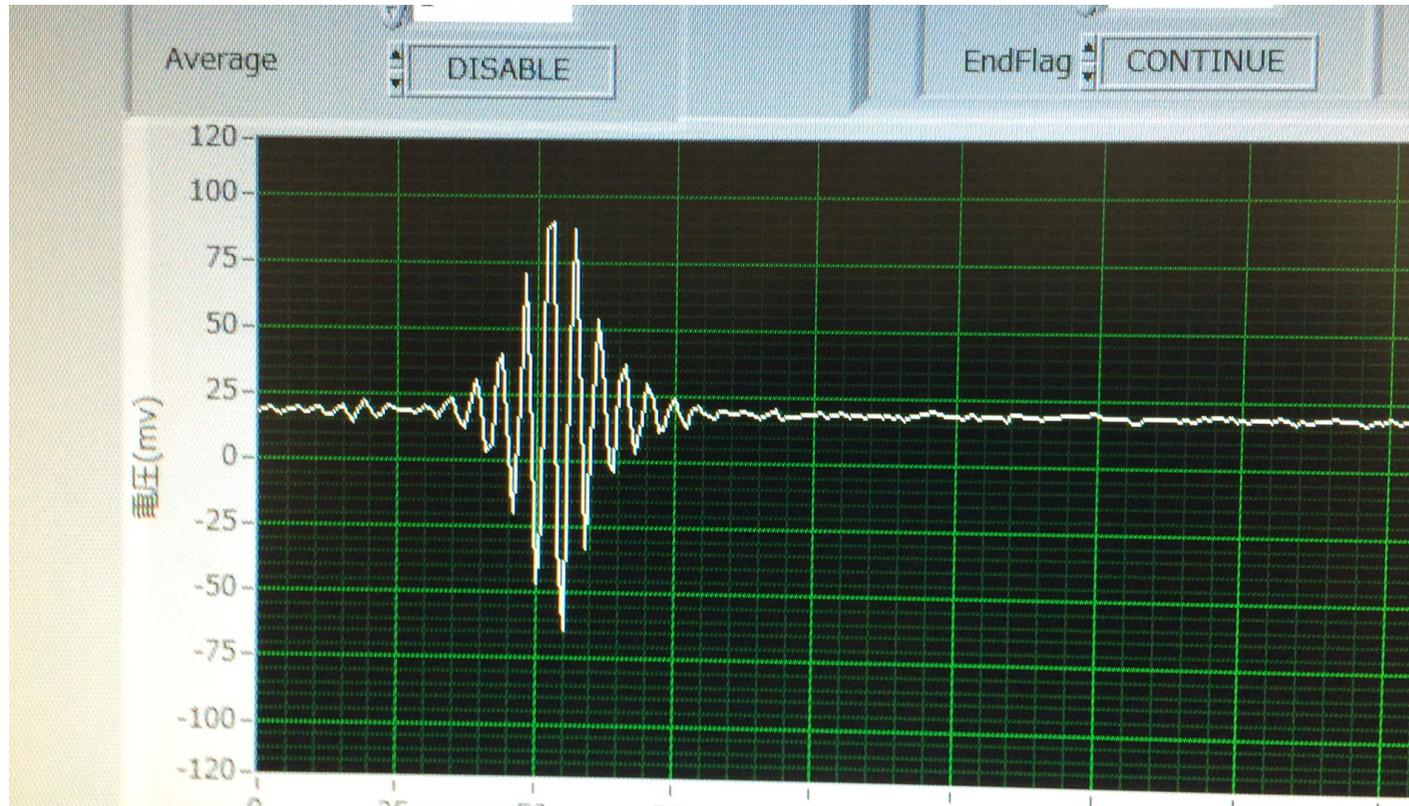
Ref) I. Coddington, PRL 100, 013902 (2008)



# CEPの残存ジッター

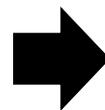


# タイミング・ジッターの影響



Menlo system :

- $f_{\text{comb}}$  current: ~200kHz
- $f_{\text{comb}}$  PZT: ~200Hz
- $Du_{\text{comb}}$  : ~130kHz

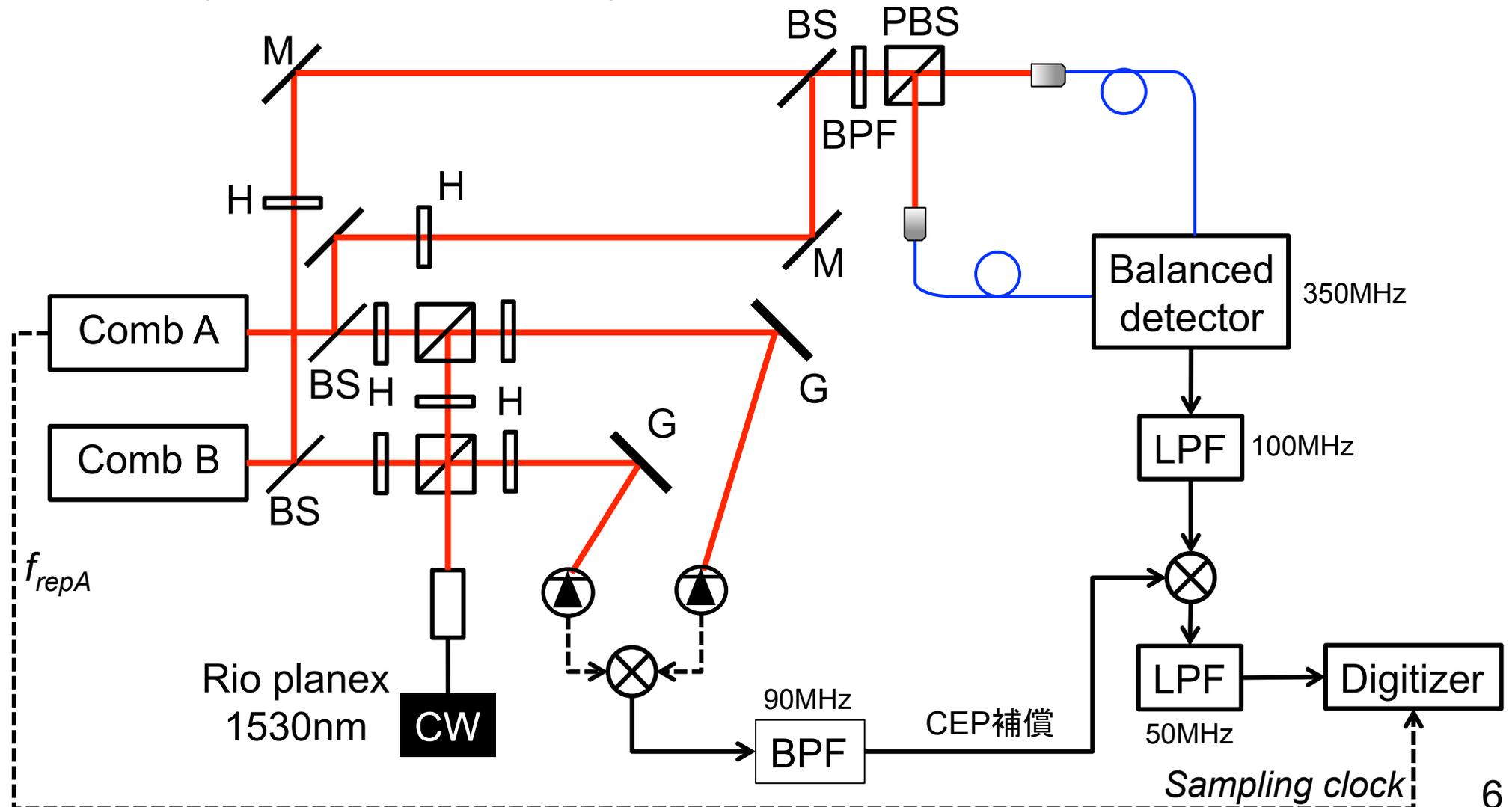


位相補償が必要

1. 数学的位相補償
2. 位相補償信号

# 実験装置

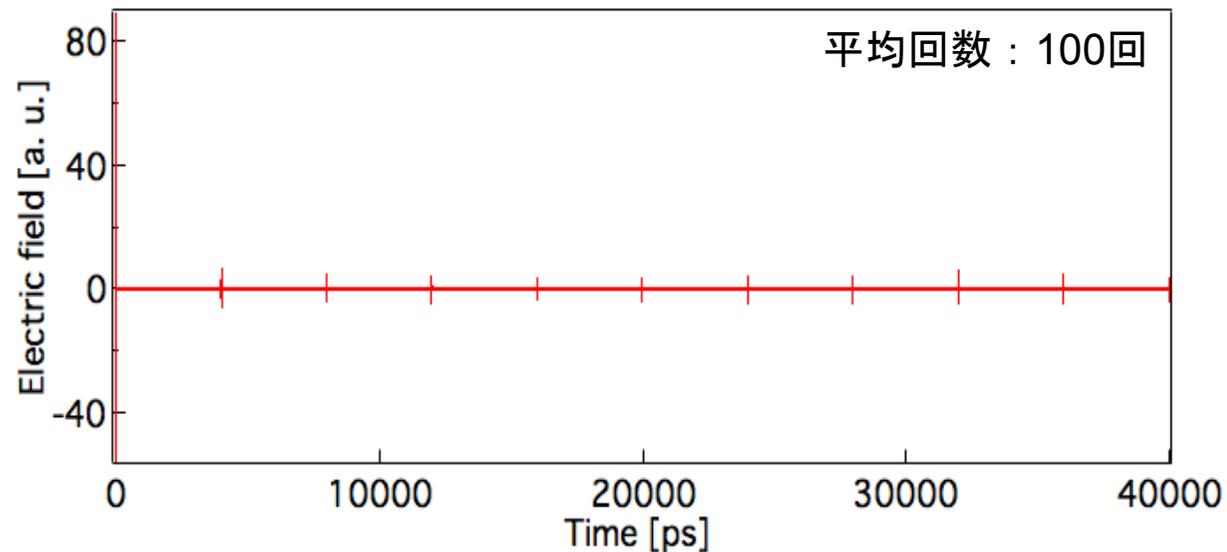
$f_{repB}$ : 250.001484MHz,  $f_{repA}$ : 249.998818MHz,  $Df=2666$ ,  $f_{ceo}$ : 20MHz



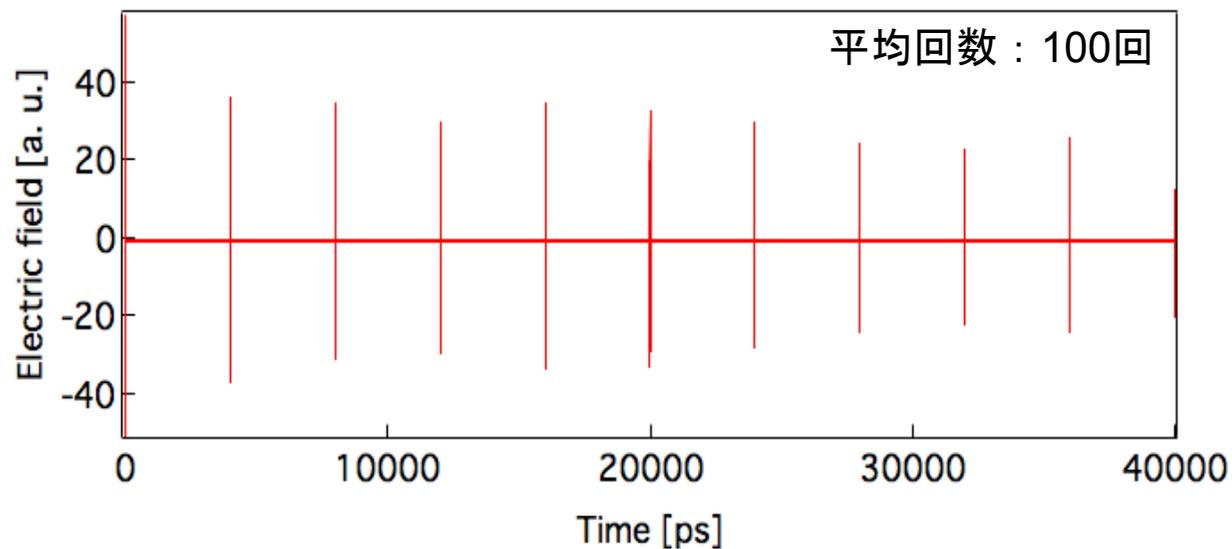
# 補償したのCEP変化



# 光パルス列電場時間波形

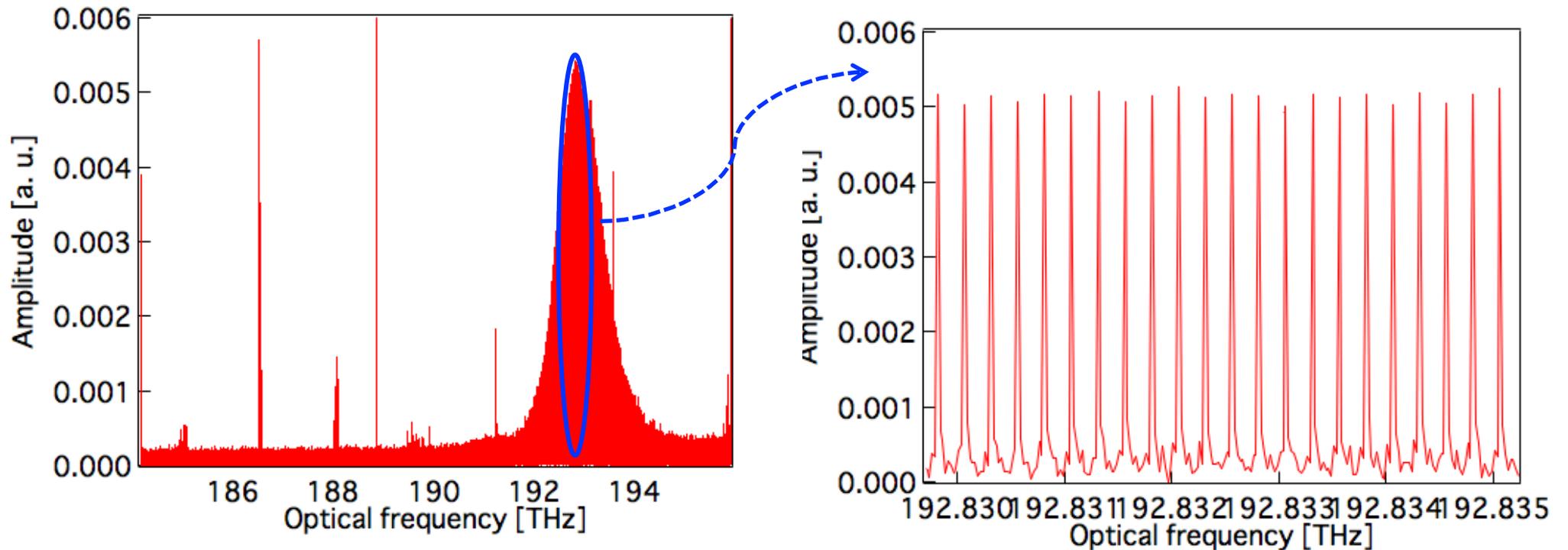


- CEP補償信号なし
- 信号消滅

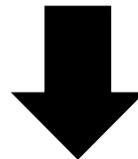


- CEP補償信号あり
- 光パルス列信号

# 光コム・スペクトル

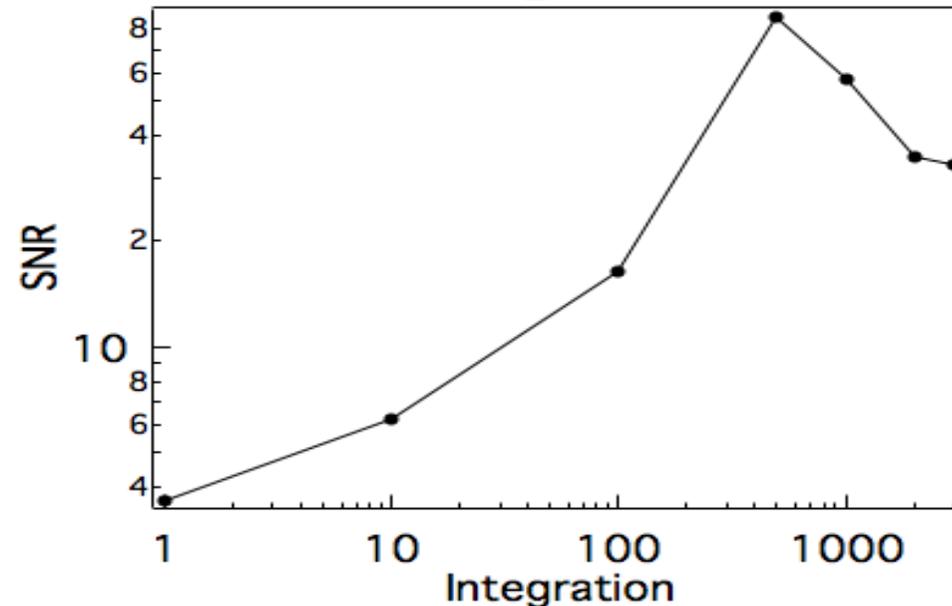
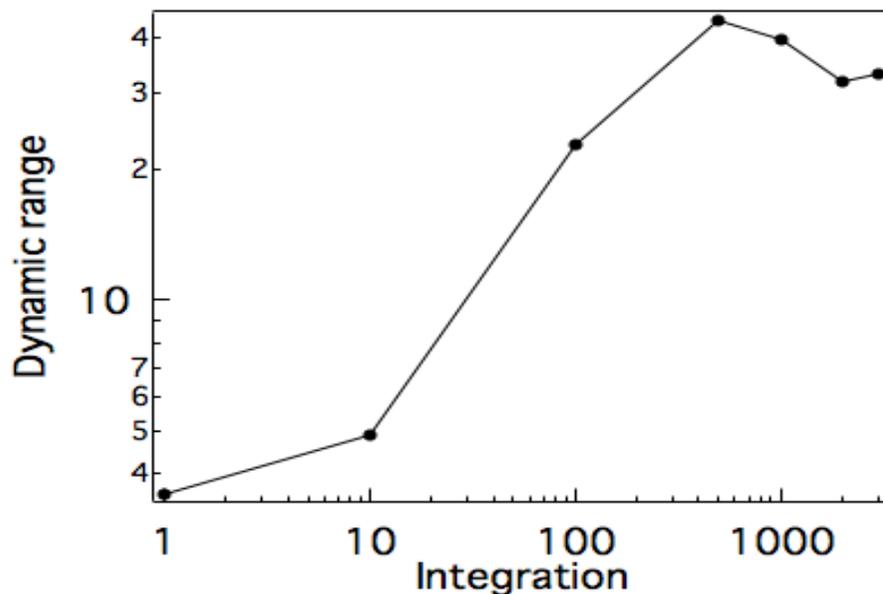
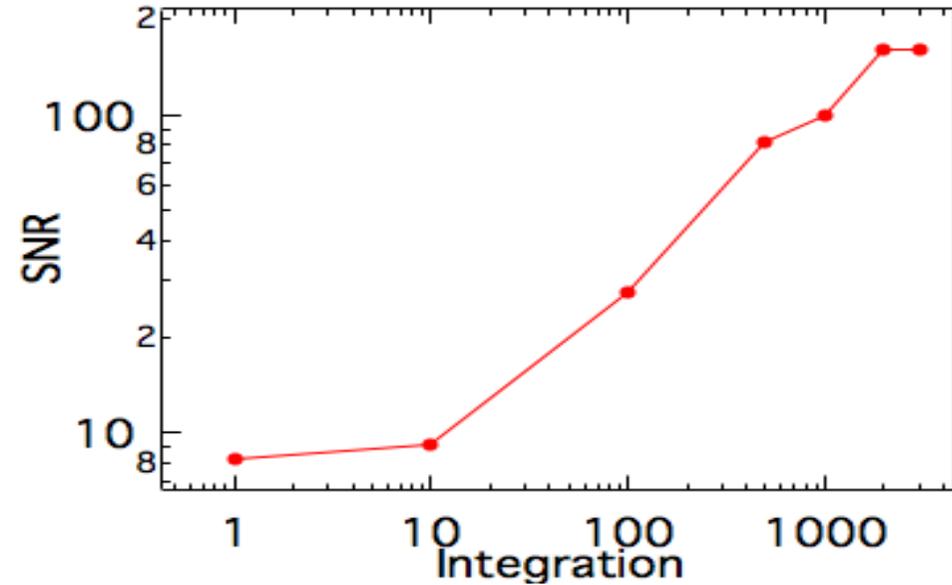
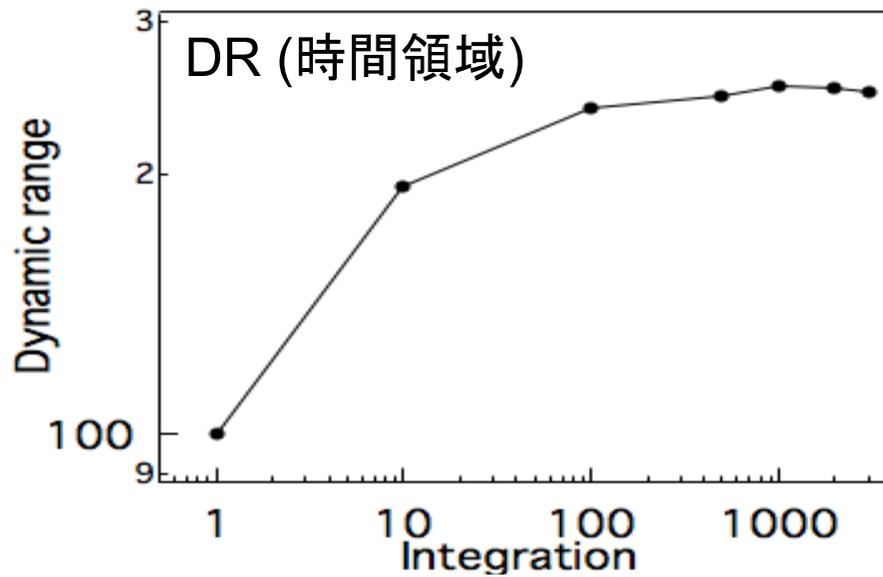


CEP補償信号



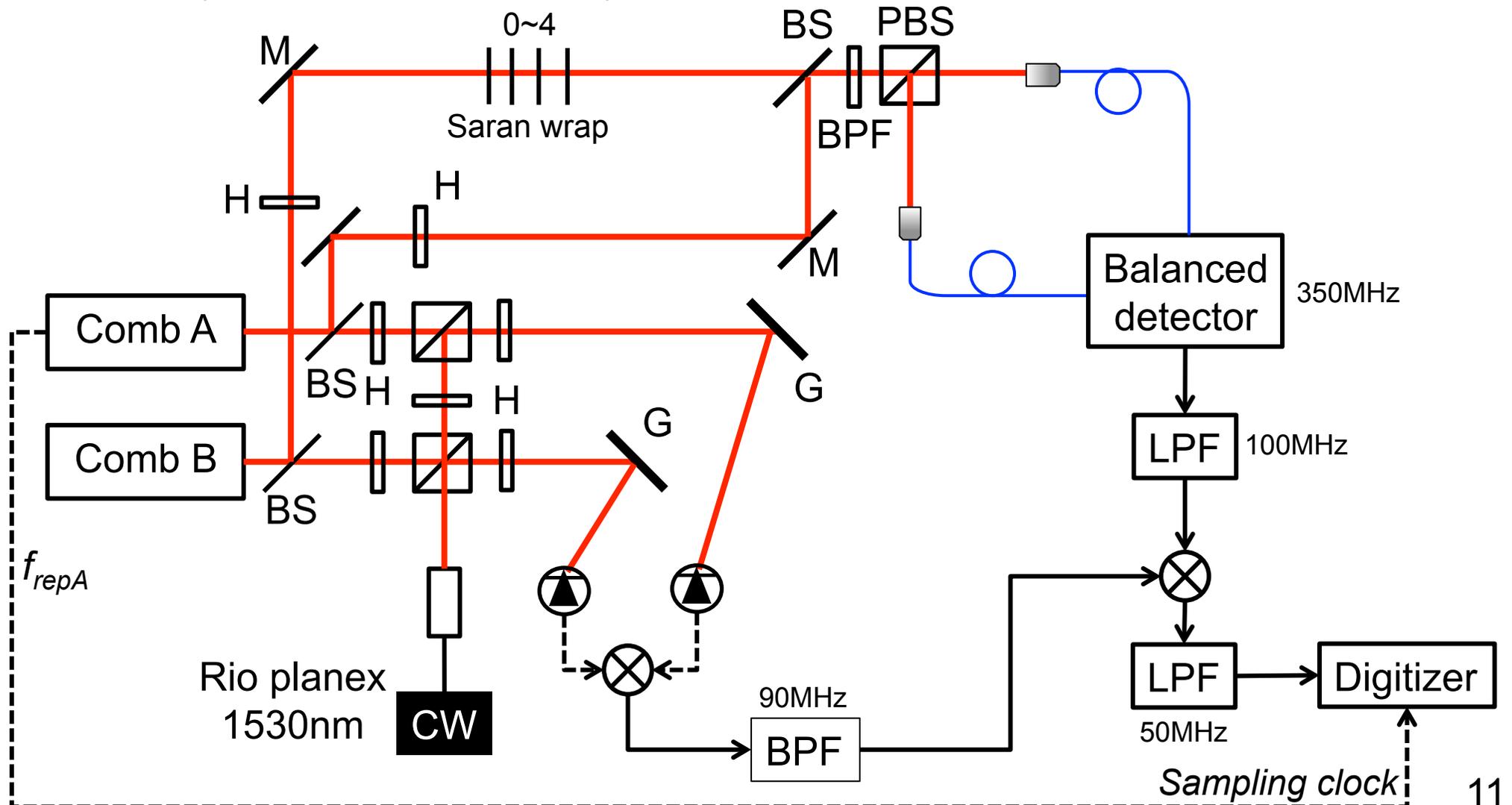
モード分解スペクトルの取得が成功した

# DR&SNR



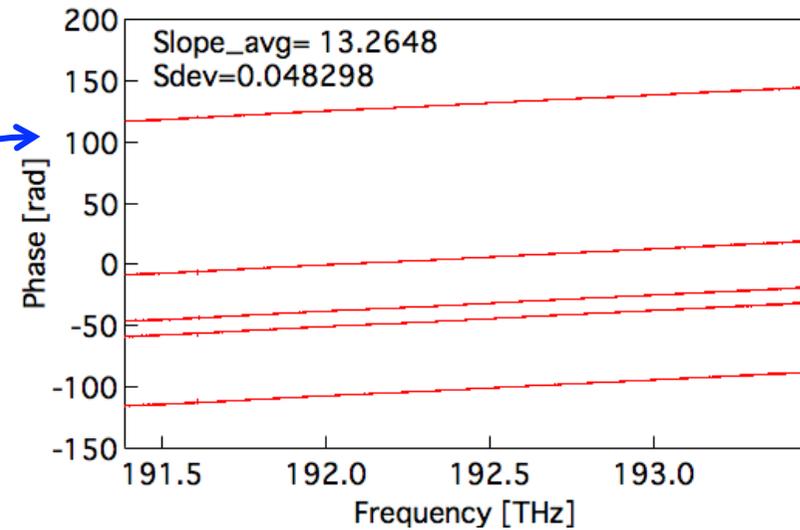
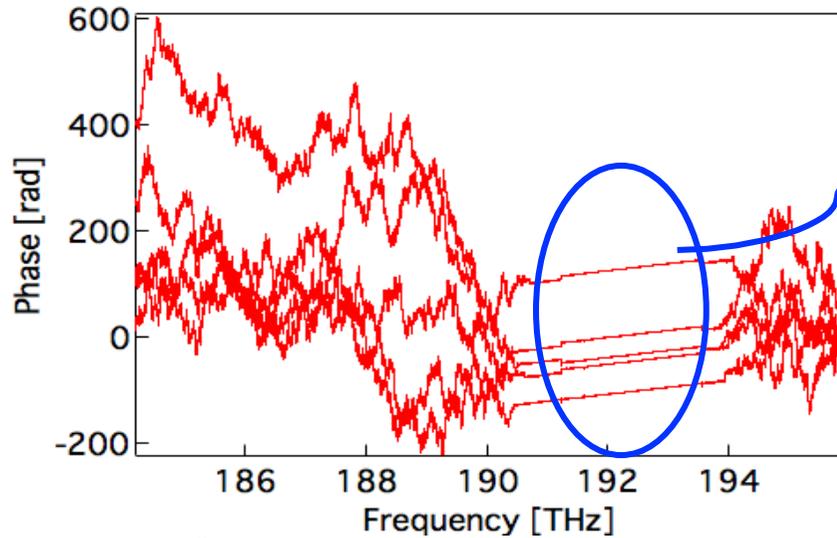
# サランラップの計測

$f_{repB}$ : 250.001484MHz,  $f_{repA}$ : 249.998818MHz,  $Df=2666$ ,  $f_{ceo}$ : 20MHz

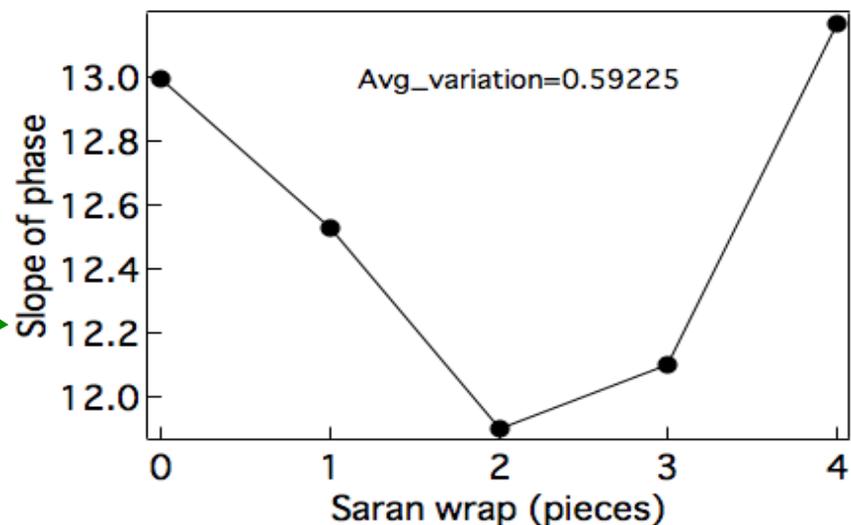
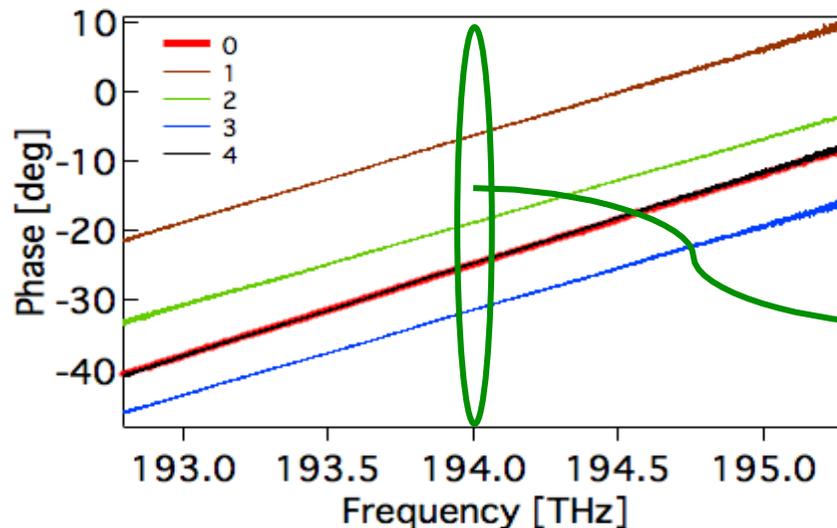


# 位相スペクトル

サランラップなし : 5回計測

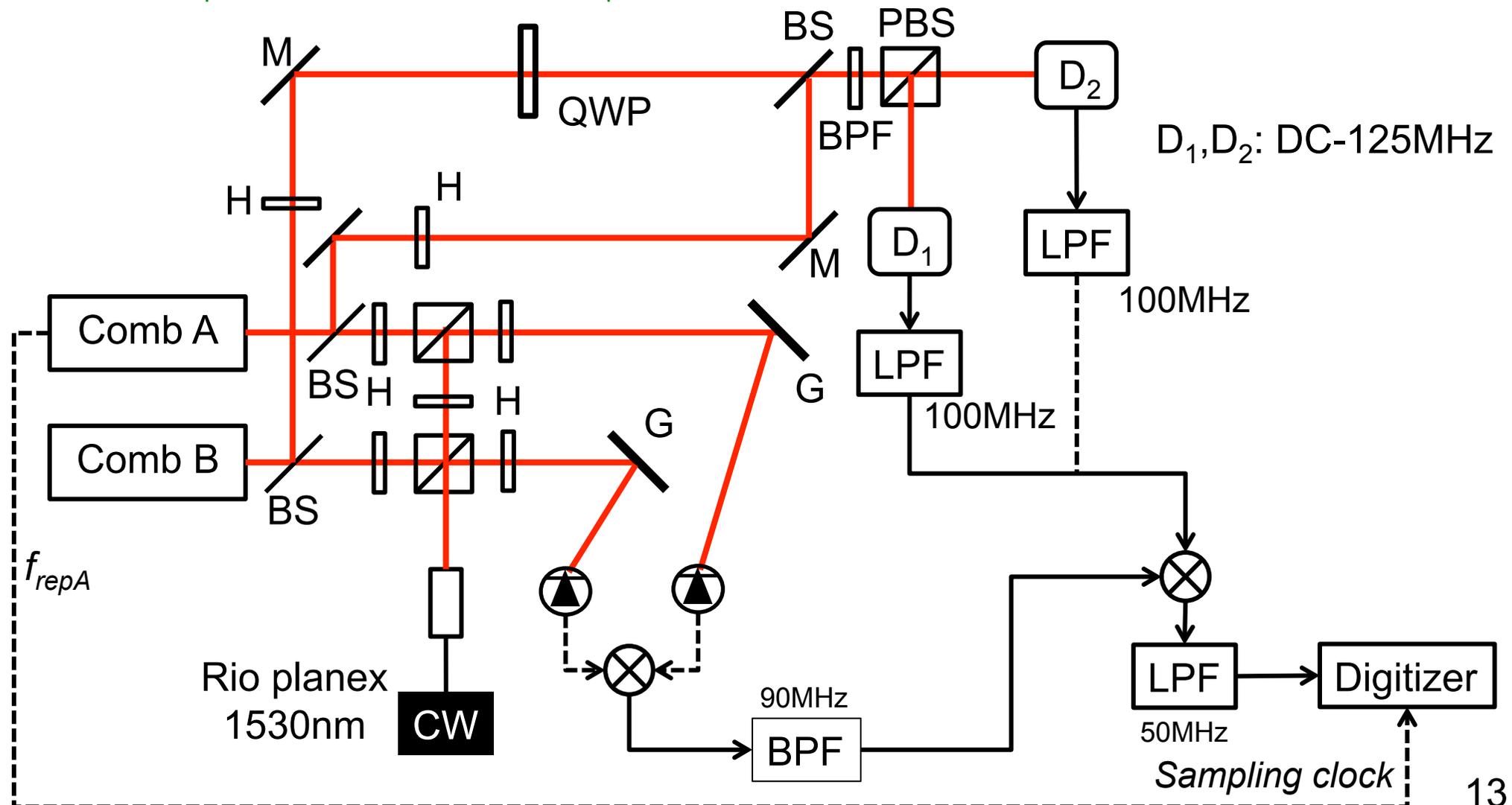


サランラップあり :



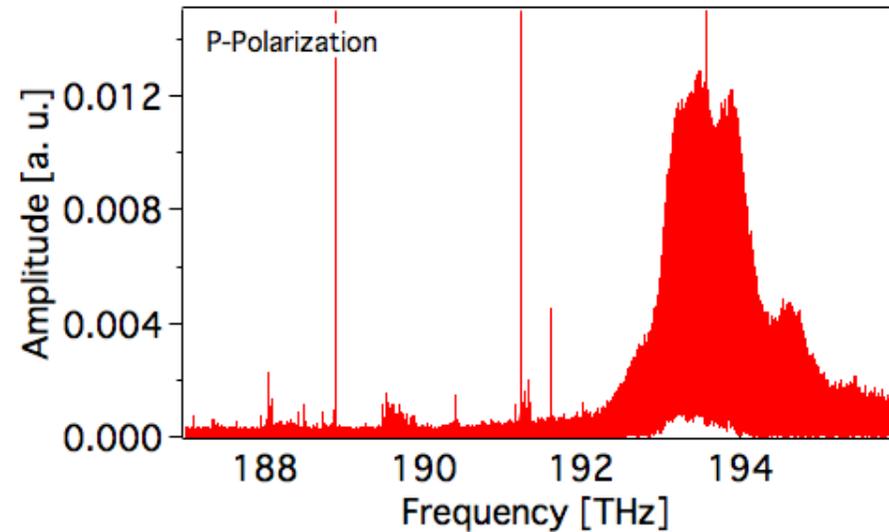
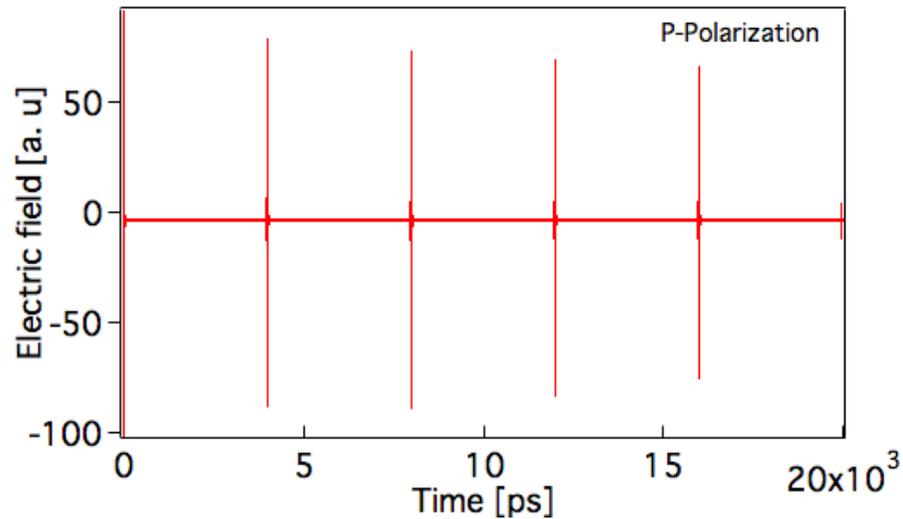
# QWPの計測

$f_{repB}$ : 250.001484MHz,  $f_{repA}$ : 249.998818MHz,  $Df=2666$ ,  $f_{ceo}$ : 20MHz

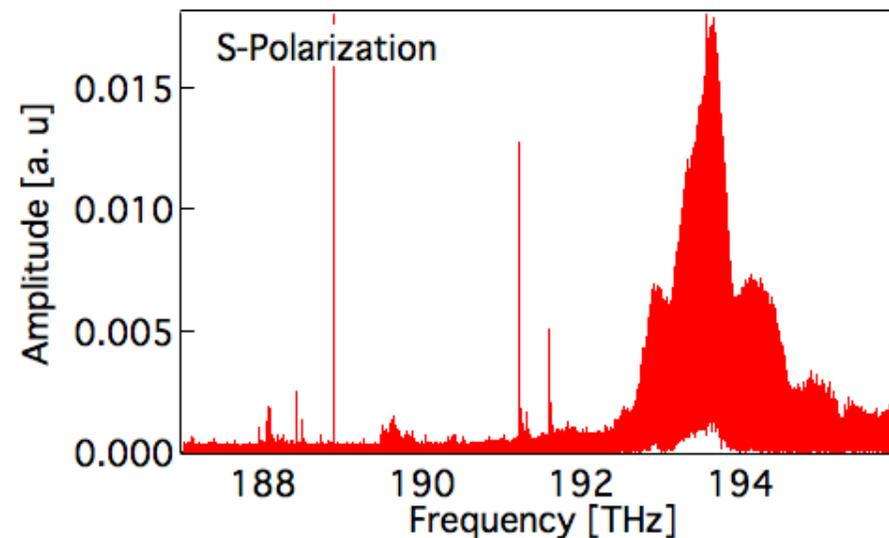
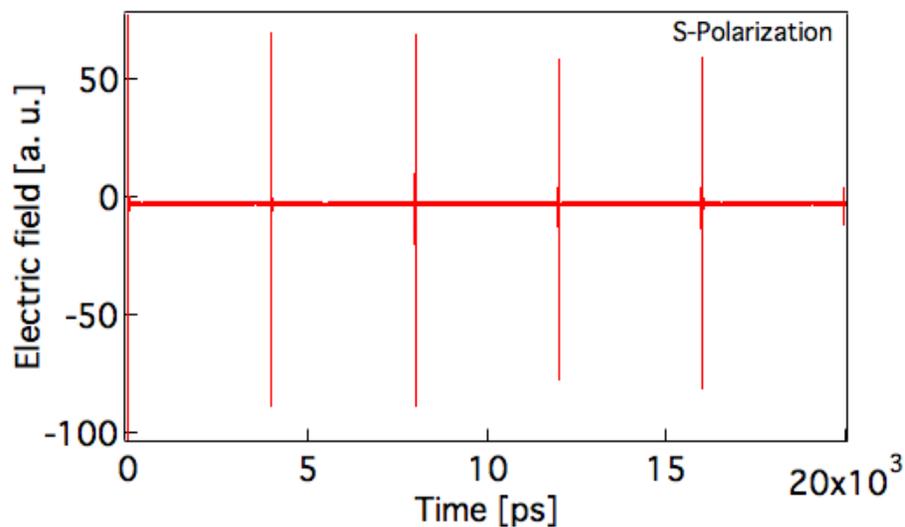


# 時間波形とスペクトル

P偏光 : 100回平均



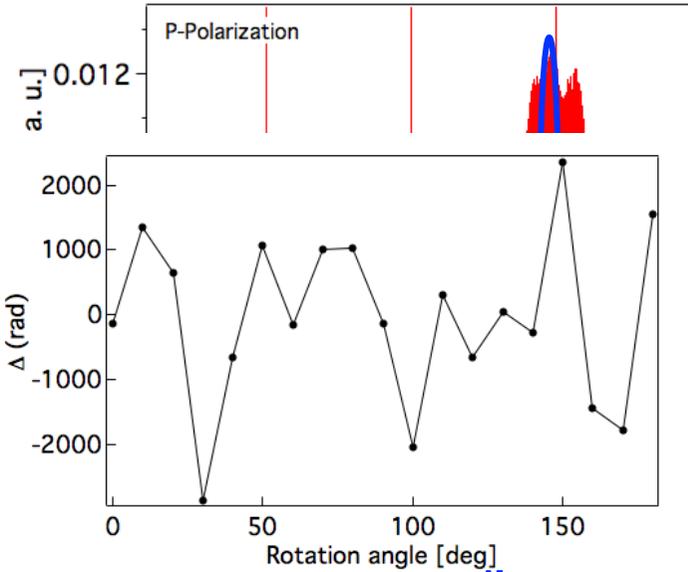
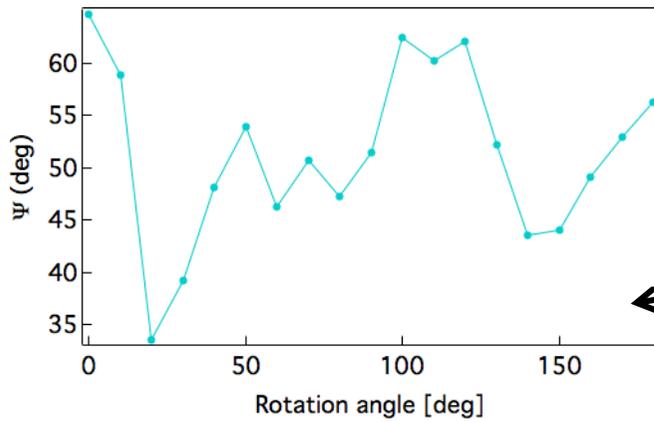
S偏光 : 100回平均



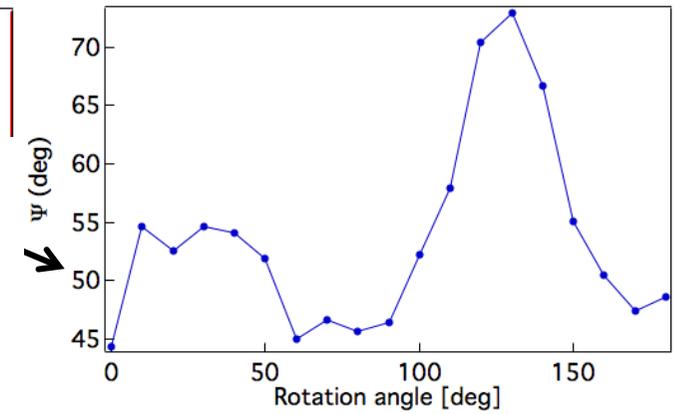
# QWP

計測角度 :  $10^\circ, 20^\circ, 30^\circ, \dots, 180^\circ$

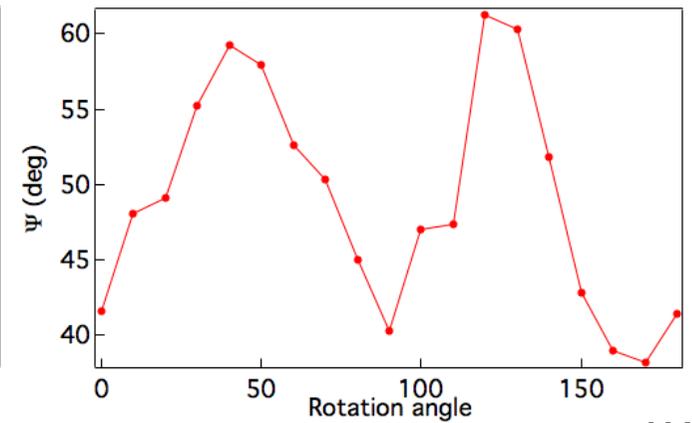
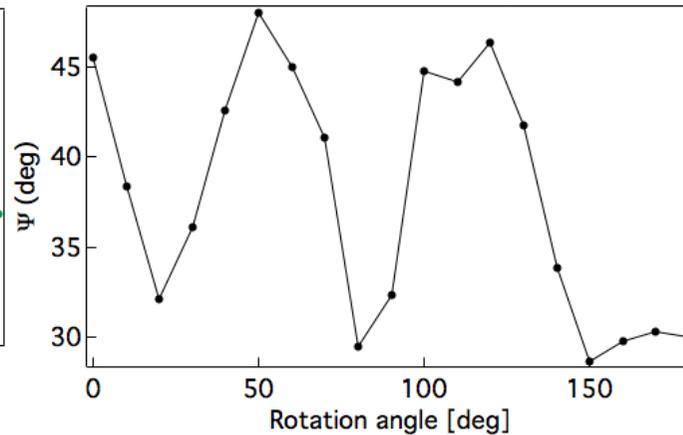
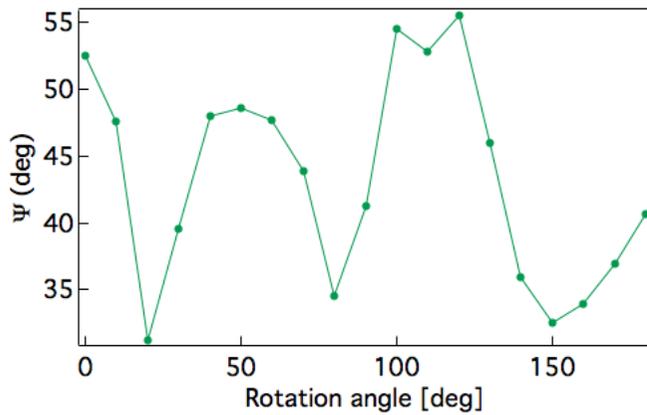
192THz付近 :



194THz付近 :

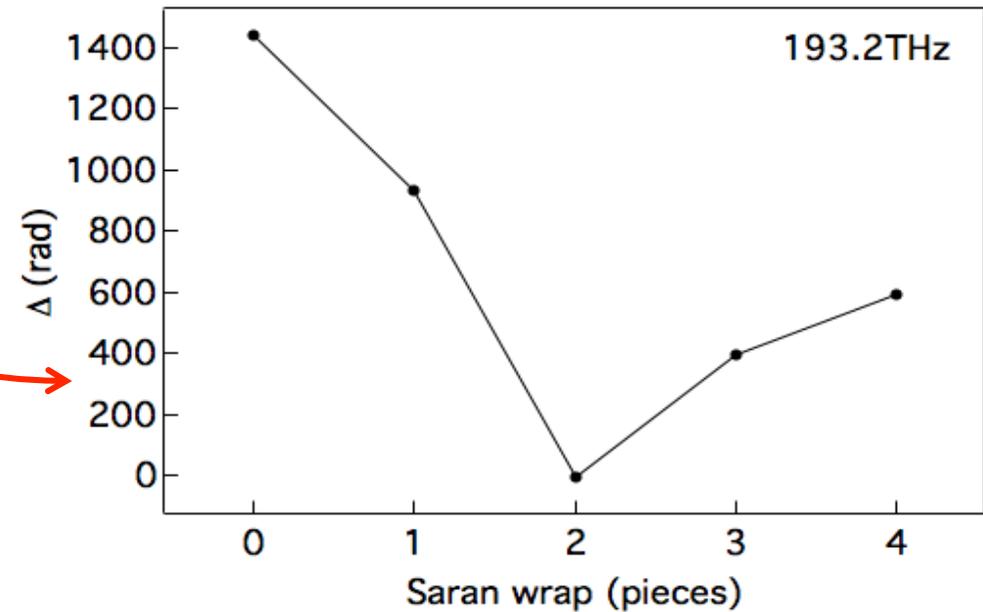
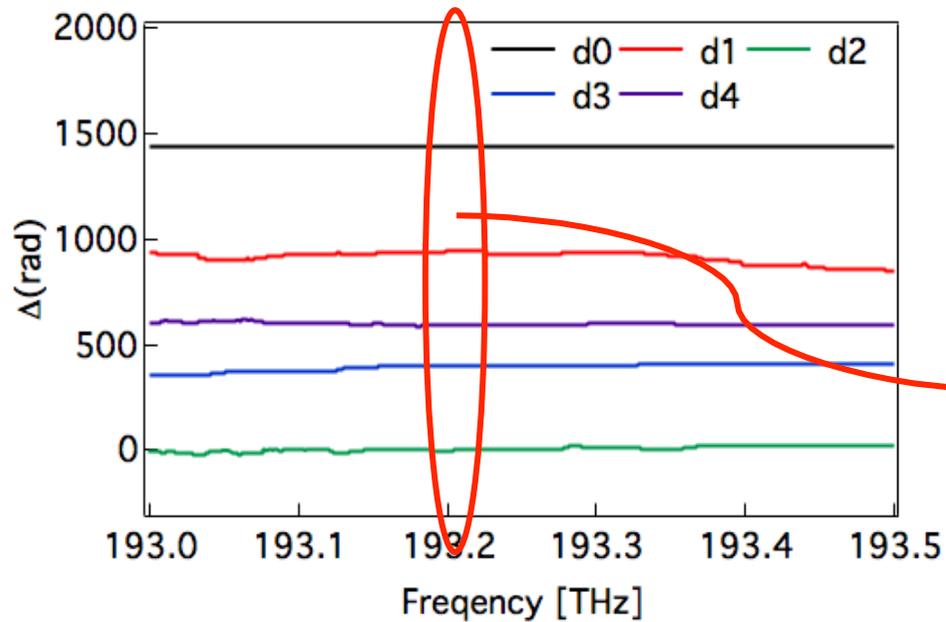


193THz付近 :



# サランラップの再計測

$$D = S_{\text{phase}} - P_{\text{phase}}$$



## まとめ

- CEP補償信号により、光コムスペクトルの取得が可能になる
- 分光エリプソに利用するために、正確な位相スペクトルの取得が必要