

# Longitudinal Diagnostics for Beam-based Feedback Systems at the European XFEL .

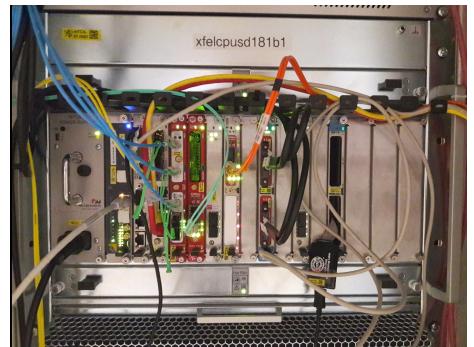
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ARD-ST3 Annual Workshop  
19 – 21 July 2017, DESY Zeuthen

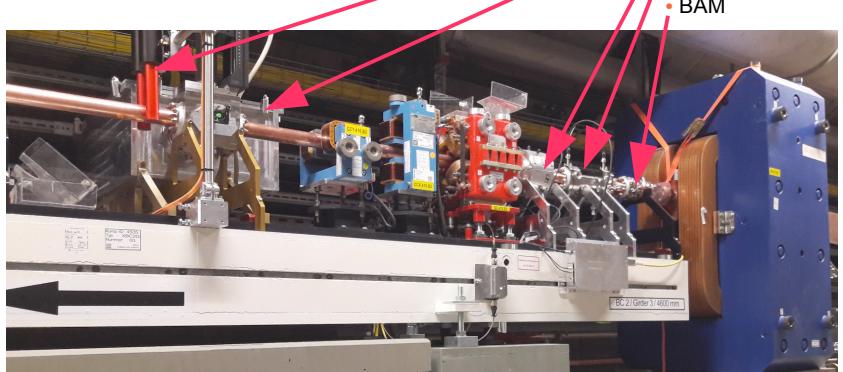
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## Special Diagnostics

Full occupation of **MTCA.4** crate with 3 bunch monitors

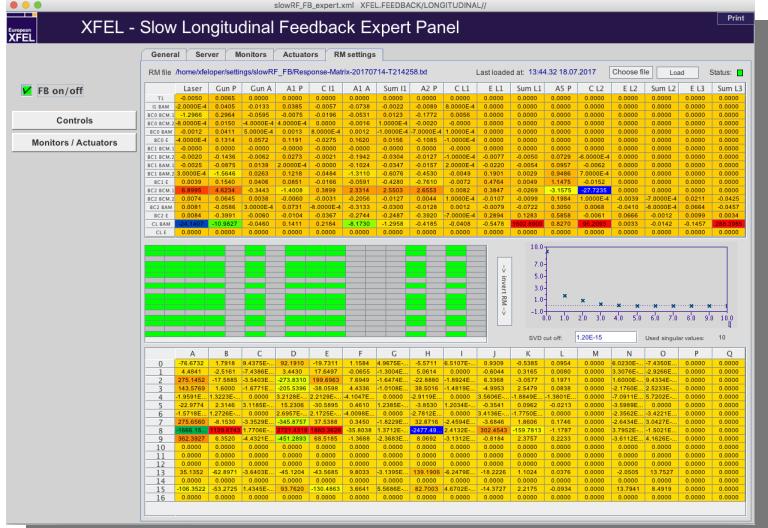
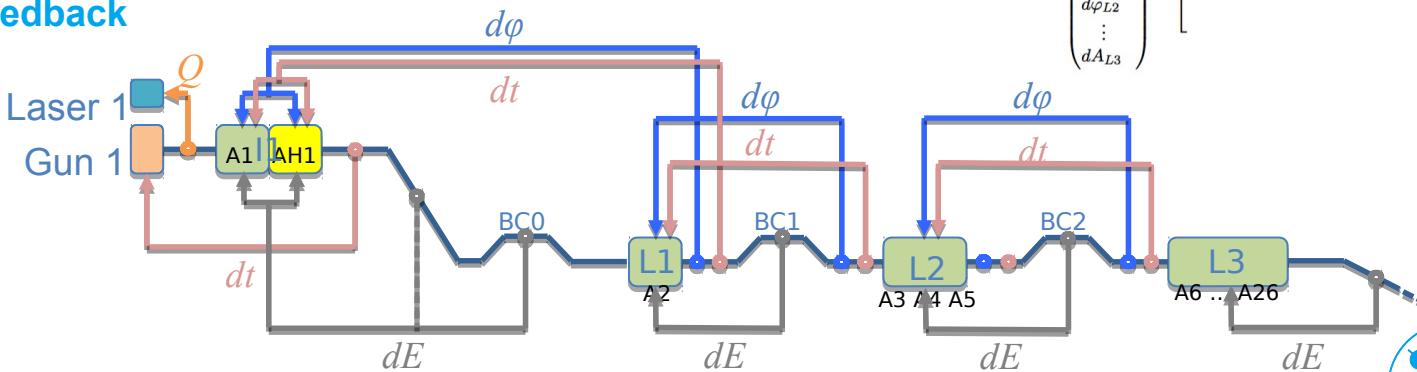
- **BAM** (arrival time)
- **BCM** (compression)
- EOD (bunch profile)



Girder with bunch diagnostics downstream of B2

- BLM
- BCM
- Toroid
- BPM
- BAM

## Longitudinal Feedback Implementation



## Beam Response Matrix Tools & Measurements

$$\begin{pmatrix} \frac{d\varphi_{Gun}}{dA_{I1}} \\ \frac{d\varphi_{P1}}{dA_{A1}} \\ \frac{d\varphi_{A1}}{dA_{AH1}} \\ \frac{d\varphi_{AH1}}{dA_{L1}} \\ \frac{d\varphi_{L1}}{dA_{L2}} \\ \frac{d\varphi_{L2}}{dA_{L3}} \\ \vdots \end{pmatrix} = \begin{bmatrix} R_{11} & R_{12} & \dots & \dots & \dots & \dots & R_{41} \\ \ddots & \ddots & \ddots & \ddots & \ddots & \ddots & \ddots \\ R_{10} & R_{11} & \dots & \dots & \dots & \dots & R_{40} \\ \ddots & \ddots & \ddots & \ddots & \ddots & \ddots & \ddots \\ R_{10} & R_{11} & \dots & \dots & \dots & \dots & R_{40} \\ \ddots & \ddots & \ddots & \ddots & \ddots & \ddots & \ddots \\ R_{ij} & & & & & & dE_{CL} \end{bmatrix} \begin{pmatrix} dBAM_{I1} \\ dBAM_{C0} \\ dBAM_{C0} \\ dBAM_{BC0} \\ dE_{BC1} \\ dBCM_{BC1} \\ dBCM_{BC2} \\ dE_{BC2} \\ dBCM_{BC2} \\ \vdots \\ dE_{CL} \end{pmatrix}$$

