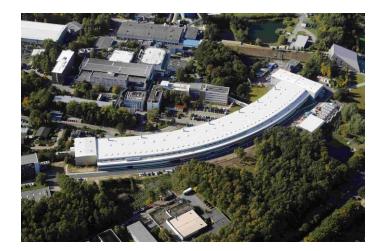
# PETRA III.

- PETRA III
- Availability
- Cavities and HOMs



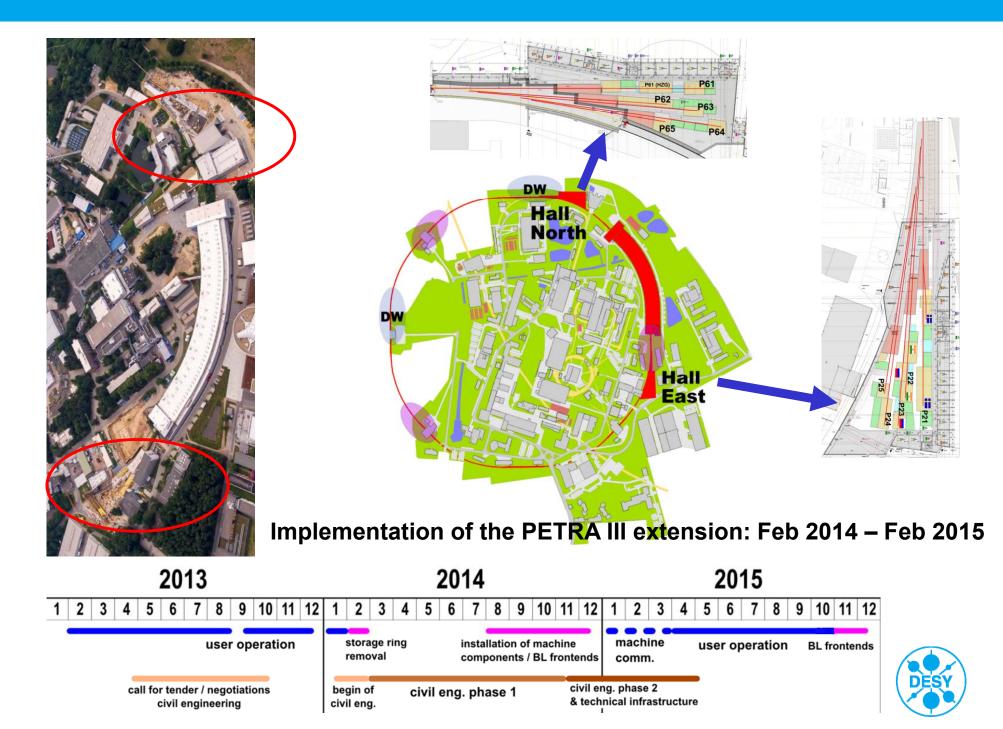


Rainer Wanzenberg DESY - MPE -

**TUD – DESY collaboration meeting** June 24, 2016

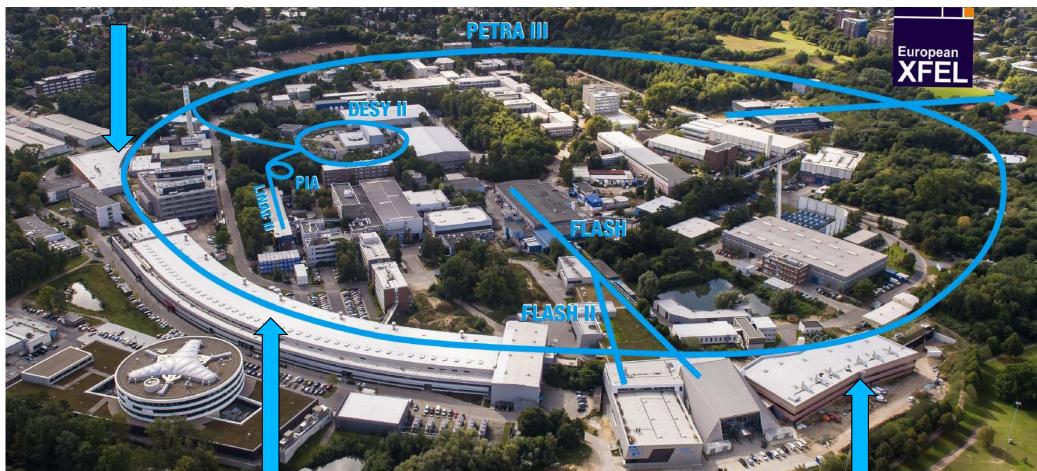


#### PETRA III in 2014: Extension Project, two new halls



### The DESY site in 2016

#### **Extension Hall East**





Max von Laue Hall

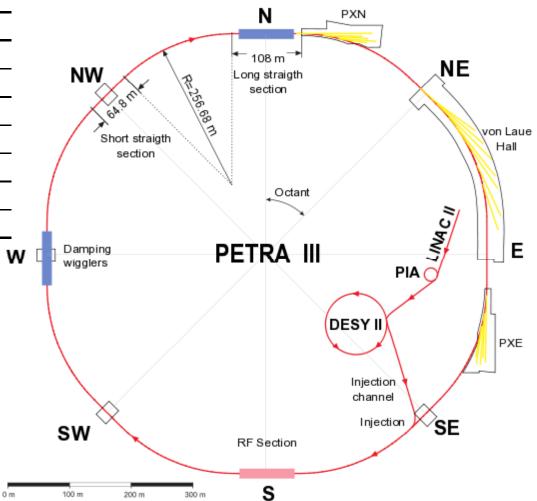
R. Wanzenberg | TUD – DESY collaboration meeting, June, 2016 | 3

## **PETRA III**

Parameter	PETRA III			
Energy / GeV	6			
Circumference /m	2304			
Emittance (horz. / vert.) /nm	1.2 /	0.012		
Total current / mA	100			
Number of bunches	960	40		
Bunch population / 10 <sup>10</sup>	0.5	12		
Bunch separation / ns	8	192		

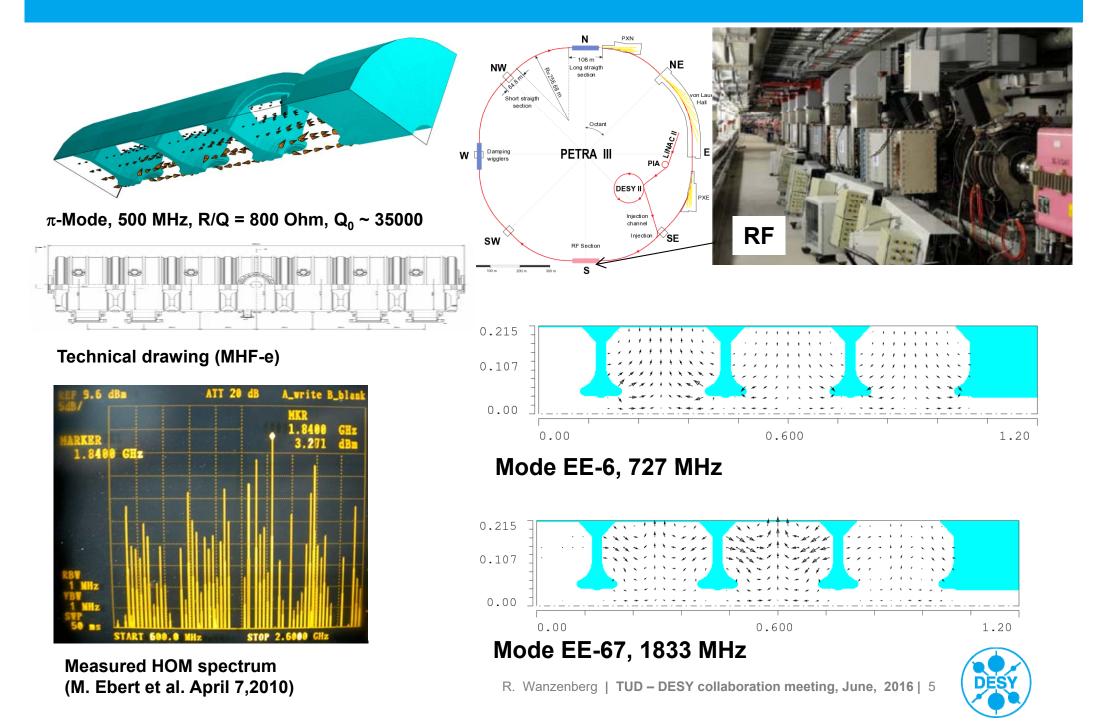
Damping Wigglers: B ~ 1.5 T,  $\lambda$  = 0.2 m 2 x 10 x 4 m = 80 m  $\epsilon_x$ : 5 nm  $\rightarrow$  1.2 nm



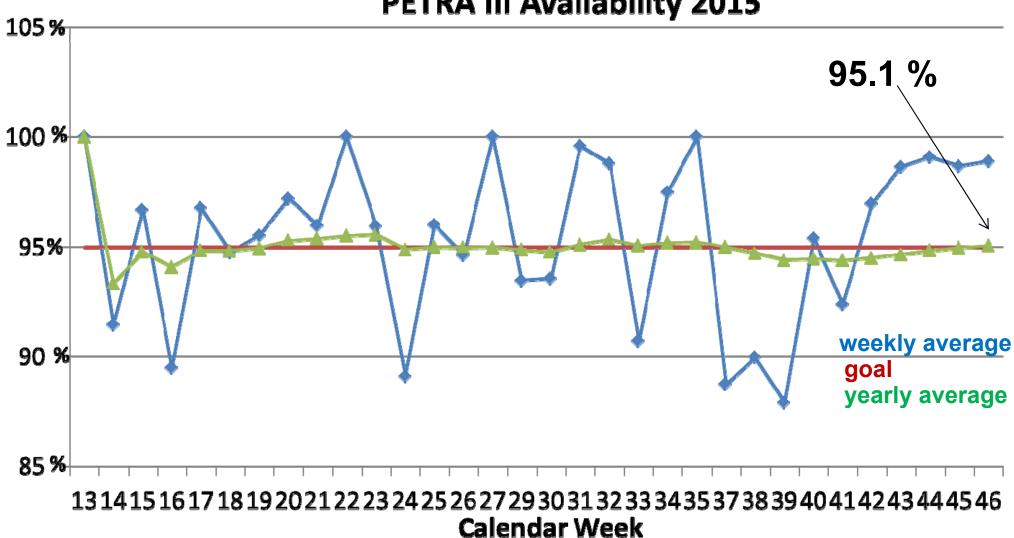


#### Dispersion correction in the wiggler sections: $D_x < 18 \text{ mm}, D_y < 5 \text{ mm}$

### PETRA III – RF



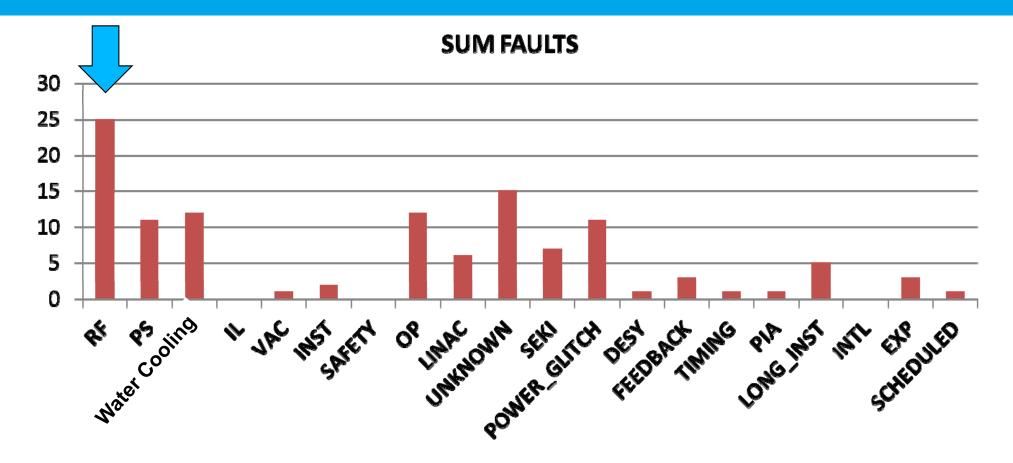
### **Availability 2015**



#### **PETRA III Availability 2015**

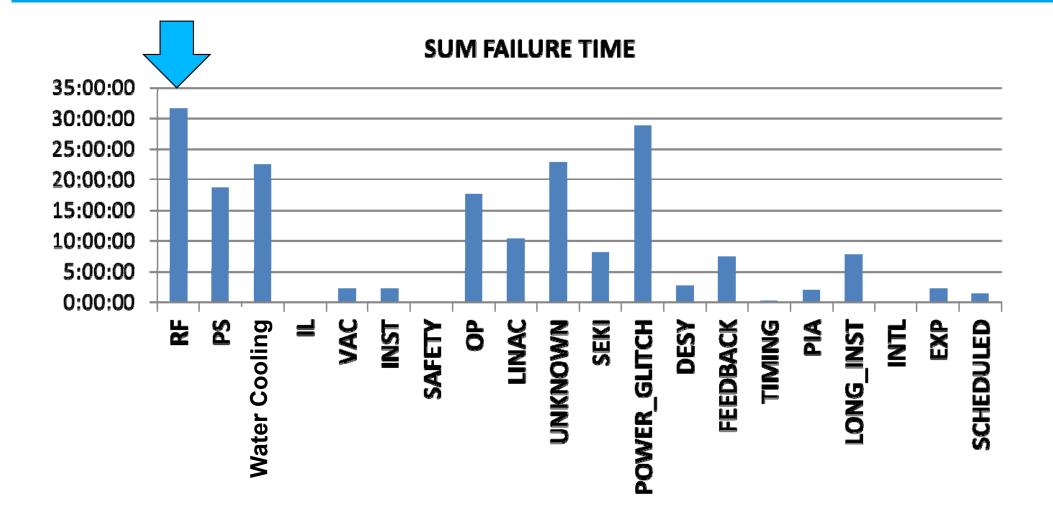


#### **Availability 2015 – number of faults**



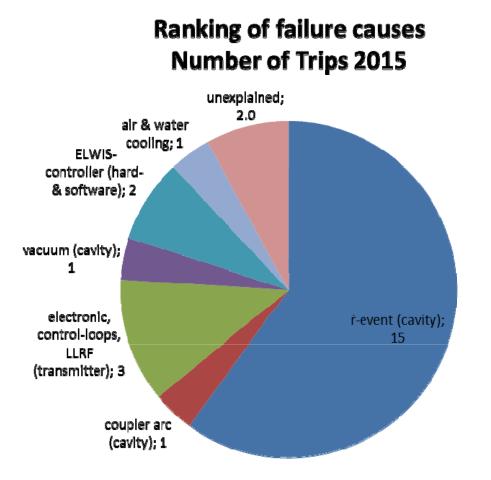


### **Availability 2015 – failure time**





#### **Overcome the r-problem !!!!**



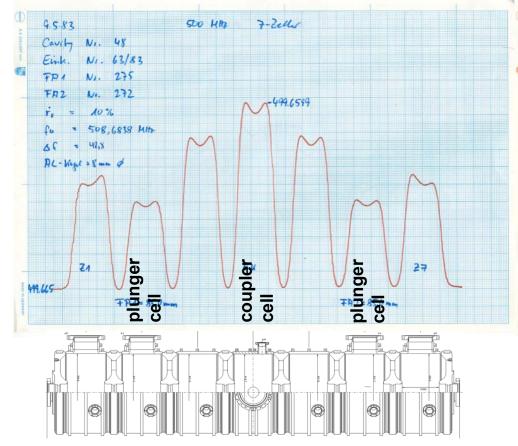
- r-problem seems to be quite persistent
- A precise CST-MWS modeling of the cavity and Eigenmode analysis provided an useful overview of all modes,
- but we have not yet understood the r-problem
- Currently, we suspect a HOM in 3.8GHz range.
- > CST-MWS Eigenmode analysis should be extended to this range.



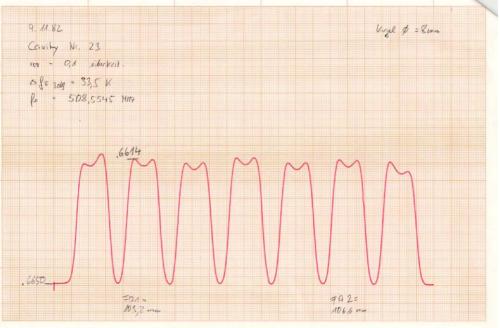
### **Cavities: field patterns and r- events**

#### **Results from bead pull measurements**

#### **Field pattern of reliable cavities**



#### Field pattern of unreliable cavities



The cavities with highest revent rate are characterized by harmonious field pattern!

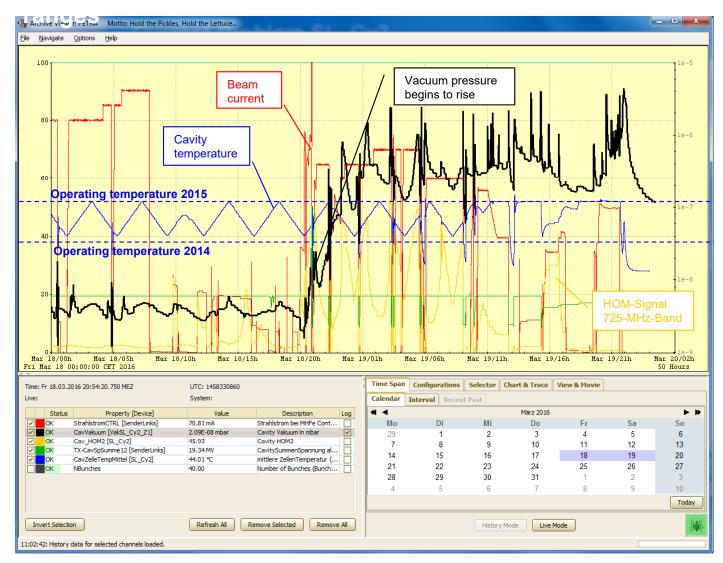
The problem could be related to the plungers somehow.



## Problems with cavity SL\_Cy2 in 2016

#### A vacuum problem occurs 18 days before start of user operation

Actually the goal was to scan cavity temperatures for sensitive r-event



Instead of the expected r៉- events we got plunger temperature and vacuum events.

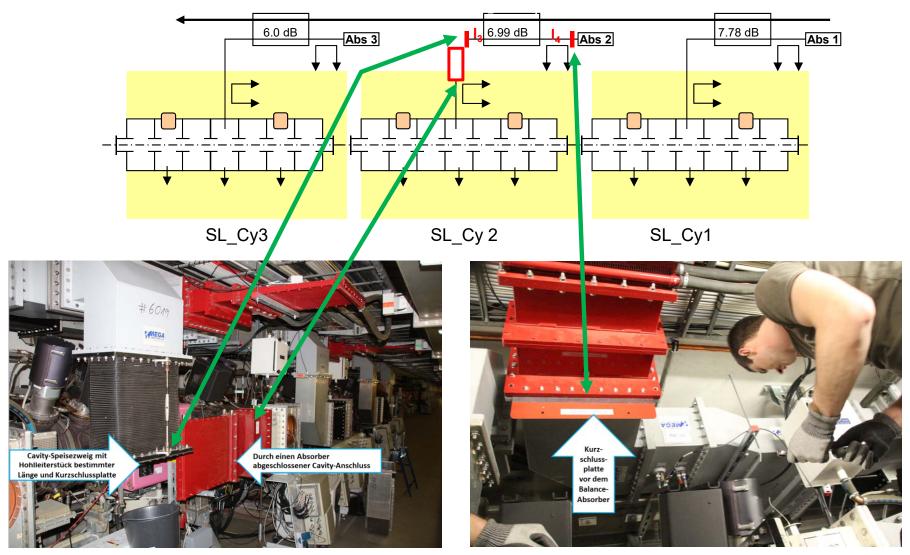
.

- The vacuum behavior looked like a leakage.
  But no leakage could be found!
- A similar event has occurred at this Cavity already in 2012!
- In order to avoid venting the vacuum system the cavity was disconnected from rf system.

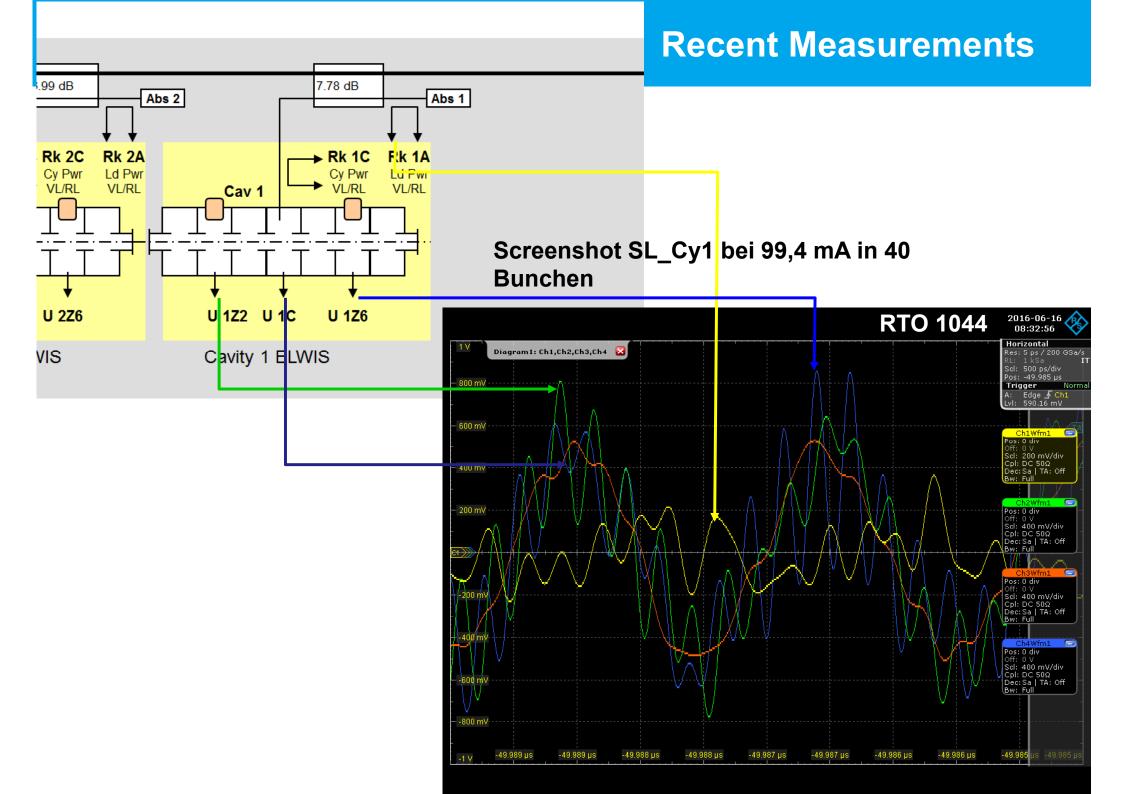


## **Recent Problem with cavity SL\_Cy2**

#### **Disconnecting SL\_Cy2 from RF system**







### PETRA III Schedule: User Run, April 7 – Dec 22, 2016

Typical week: 168 h user run, Monday ... Wednesday 7 h, Thursday 7 h ... Sunday Wednesday: maintenance or short study period + Test run starting at ~ 20 h ... 23 h

1     Interlock     Line     MOT     1     MOT     MOT<	2016	Jan	Feb	March	April	May	June		July	Aug.	Sep.	Okt.	Nov.	Dez.	
2     Test     Set-up     2     Motion     MOTion       3     MDT/Test     MDT     3     MDT     MDTion     MDTion       4     Shut     MDT/Test     MDT     4     MDTion     MDTion </th <th>1</th> <th></th> <th></th> <th>Interlock</th> <th>Line</th> <th></th> <th>MDT</th> <th>1</th> <th>MDT</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	1			Interlock	Line		MDT	1	MDT						
3     Mot	2				Set-up			2					MDT		
5   Down   MDT/Run   More   5   Week   More   More <t< td=""><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>MDT</td><td></td><td></td><td></td><td></td><td></td></t<>	3									MDT					
6     MOT     6     MOT     MOT     MOT     MOT     MOT     MOT     MOT     MISPECTION Of it       7     0     Technical USER     7     0     MDT     <	4	Shut			MDT/Test	MDT		4				Service			
0     Technical USER     0     7     100     MDT     M	5	<b>Down</b>			MDT/Run			5				Week			Inspection of the
8   Start up   RUN   does   MD1   8   Service   MDT     10	6				MDT				MDT			MDT			
8   Start up   RUN   does   MD1   8   Service   MDT     10	7			Technical	USER			7			MDT	MDT		MDT	plungers of
10   MO   MOT   110   MO   MOT   MOT   MOT     11   MOT   MOT   11   MOT   MOT   MOT   MOT     12   MOT   13   MOT   12   MOT   MOT   MOT     13   MOT   13   MOT   MOT   Service   MOT   Service   MOT     14   MOT   MOT   15   MDT   Week   MOT   Service   MOT     16   MOT   Service   17   Russ   MOT   MOT   MOT   In Aug. 2016     18   MOT   MOT   20   MOT   MOT   MOT   MOT   MOT   In Aug. 2016     20   MOT   MOT   23   Test   MOT   MOT   In Aug. 2016     21   MOT   MOT   23   Test   MOT   Shut   Down     22   MOT   26   MOT   26   MOT   MOT   Shut     23   MOT   26   MOT   26   MOT   MOT   MOT   MOT   MOT	8			start up	RUN		MDT	8							
11   11 <td< td=""><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Week</td><td></td><td></td><td>MDT</td><td></td><td>cavity SL_Cy 2</td></td<>	9									Week			MDT		cavity SL_Cy 2
12   MDT   MDT   12   MDT   MD															
13   MDT   MDT   13   MDT   MDT   Service   MDT     14   MDT   MDT   14   MDT   Service   MDT     15   MDT   MDT   15   MDT   Week   MDT     16   MDT   MDT   16   Test   MDT   Service   MDT     17   MDT   Service   17   Runs   MDT   motor   motor   motor   motor     18   MDT   Week   18   C   MDT   motor   mot						MDT									
14   MD   MDT   MDT   MDT   MDT   Service   MDT     15   MDT   MDT   15   MDT/   Week   MDT   Week   MDT   Week   MDT   MDT   Week   MDT												MDT			
15   MDT   MDT   15   MDT/   Week   Study     16   MDT   Service   17   Runs   Image: Service   16   Image: Service   17   Runs   Image: Service   16   Image: Service   17   Runs   Image: Service   16   Image: Service   16   Image: Service   17   Image: Service   16   Image: Service   17   Image: Service   16   Image: Service   17   Image: Service   17 <td></td> <td></td> <td></td> <td></td> <td>MDT</td> <td></td> <td></td> <td></td> <td>MDT</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>					MDT				MDT						
16   MDT   MDT   Service   17   Runs   Image: Constraint of the service of th	-										MDT			MDT	
16   MDT   MDT   Service   17   Runs   Image: Constraint of the service of th							MDT						Week		Study
18   MDT   Week   18   18   MDT   Main   Mai															
19   MDT   MD										Runs					– period
13   13   13   13   13   10   100 <td></td> <td></td> <td></td> <td>_</td> <td></td> <td>Week</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>in Aug. 2016</td>				_		Week									in Aug. 2016
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22MDTMDT22MDT/Image: Shut23MDTC23TestMDTShut24BeamC24RunsDown25LineMDT25Image: Set-UpImage: Set-UpImage: Set-Up26Set-UpMDTService27MDTImage: Set-UpImage: Set-Up28MDTMDTService27MDTImage: Set-UpImage: Set-Up29MDTMDT30Image: Set-UpImage: Set-UpImage: Set-Up30MDTMDT30Image: Set-UpImage: Set-UpImage: Set-Up28MDTMDTImage: Set-UpImage: Set-UpImage: Set-Up29MDTImage: Set-UpImage: Set-UpImage: Set-UpImage: Set-Up30MDTImage: Set-UpImage: Set-UpImage: Set-UpImage: Set-Up28Image: Set-UpImage: Set-UpImage: Set-UpImage: Set-UpImage: Set-Up30MDTImage: Set-UpImage: Set-UpImage: Set-UpImage: Set-Up30Image: Set-UpImage: Set-UpImage: Set-UpImage: Set-UpImage: Set-Up28Image: Set-UpImage: Set-UpImage: Set-UpImage: Set-UpImage: Set-Up30Image: Set-UpImage: Set-UpImage: Set-UpImage: Set-UpImage: Set-Up29Image: Set-UpImage: Set-UpImage: Set-UpImage: Set-UpImage: Set-Up30Image: Set-Up<					MDT	MDT			MDT						
23MDTImage: Second Secon	-										MDT			MDT	
24BeamBeamImage: Second Secon							MDT								
25LineMDT25IIMDTI26Set-UpI26IMDTMDTI27MDTService27MDTIII28IMDTVeek28MDTII29MDTMDT29IIII30MDTIMDT30IIMDTMDT													MDT		
26Set-UpSet-UpMot26MotMDTMDT27MDTService27MDTPPPP28Week28MDTPPPP29MDTPPPPPP30MDTMDT30PPMDTMDT	-									Runs				Down	
27MDTService27MDTInc.Inc.Inc.28MDTMDTMDTMDTMDTMDTInc.29MDTMDT29Inc.Inc.Inc.Inc.30MDTMDT30Inc.Inc.MDTInc.Inc.	-					MDT									
28   MD   Week   28   MDT   Image: Second seco				Set-Up								MDT			
29     MDT     29     29     29     20	-				MDT				MDT						
30 MDT MDT 30 MDT S0 MDT	-						Week				MDT				
							MDT						MDT		
31 MDT And Comparison   R. Wanzenberg   IUD – DESY collaboration meeting, June, 2016   14 (DESY )	31			Beam				31	L Wee	MDT		SV oplich	ovotion m	ooting !:::	

# Thank you for your attention !

