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Revised Budget  
Instrument: ODIN – Neutron Imaging

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## **SUMMARY**

This document presents a revised budget for the instrument ODIN. This Budget follows the advice and suggestions given during the Scope Setting Meeting on Oct. 5<sup>th</sup>. The new total amount is now 11.6 M€. A previous discrepancy in the Phase 1 budget was resolved in this version.

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## 1. OVERVIEW

The new budget presented is based on the recommendations and requests discussed during the Scope Setting Meeting on October 5<sup>th</sup> 2016. The new total amount is 11.6 M€. As requested, over 9 man-years were moved from salary group 2 (77€/h) to salary group 3 (60€/h). Man-years have been redistributed to reduce the management and integration share. Labor costs related to work unit 13, Vacuum, have been eliminated, while about 50 k€ have been added to the T0 chopper labor cost. Some 50 k€ have been moved from PSS labor to Motion Control labor. Funds for travel were added as well.

The total budget is shown as well as the individual partner contributions by the European Spallation Source (ESS), Paul Scherrer Institute (PSI) and Technische Universität München (TUM).

Finally, it is important to note that there is a potential VAT amount between 842,700 € and 926,900 € (if the full contingency is used) to be paid additionally on TUM purchases.

### 1.1. Budget Summary

The table below shows a summary of the total budget. It illustrates how the man-years are divided between different salary groups and how the total travel costs were estimated.<sup>1</sup>

**Table 1: Combined Budget Overview**

<b>Budget Summary</b>					
<b>Salaries</b>		<b>Travel</b>			
hourly	annually	annually	Man-years	Sum (Salaries)	Sum (Travel)
100	180,000 €	1,800 €	0.5	88,200 €	900 €
77	138,600 €	1,800 €	3.0	417,100 €	5,400 €
60	108,000 €	5,200 €	15.4	1,658,800 €	79,900 €
48	86,400 €	1,800 €	3.2	275,600 €	5,800 €
40	72,000 €	0 €	1.5	104,300 €	0 €
		Sub-total		2,544,000 €	92,000 €
		Contingency		254,400 €	9,200 €
		Phase 1		554,000 €	-
		<b>Sub-totals</b>	<b>23.5</b>	<b>3,352,400 €</b>	<b>101,200 €</b>
		Procurements		7,407,000 €	
		Contingency		740,700 €	
		<b>Sub-total</b>		<b>8,147,700 €</b>	
<b>Grand Total</b>				<b>11,601,300 €</b>	

<sup>1</sup> See Appendix for more details

## 2. DETAILED BUDGET

### 2.1. Combined Budgets

The Tables below show the combined budgets with man-year and financial details respectively.

**Table 2: Combined Budget, Man-years**

	<b>01</b> Management	<b>02</b> Design	<b>03</b> Procurem. Labor	<b>04</b> Installation	<b>05</b> Cold Com- missioning	<b>Total</b>
<b>00</b> Phase 1	-	-	-	-	-	<b>4.5</b>
<b>02</b> Neutron Transport	0.61	0.89	0.45	0.46	0.69	<b>3.10</b>
<b>03</b> Heavy Shutter	0.33	0.51	0.17	0.33	0.24	<b>1.58</b>
<b>04</b> T0 Chopper	0.21	0.35	0.15	0.15	0.19	<b>1.05</b>
<b>05</b> Choppers	0.67	0.86	0.45	0.69	0.71	<b>3.38</b>
<b>06</b> Cave Interior	0.78	0.71	0.77	0.81	0.93	<b>4.00</b>
<b>07</b> Add ons	-	-	-	-	-	-
<b>08</b> Motion Control and EE	0.45	0.52	0.44	0.62	0.46	<b>2.49</b>
<b>09</b> White beam detectors	0.31	0.39	0.24	0.33	0.22	<b>1.49</b>
<b>10</b> ToF Detectors	0.19	0.28	0.18	0.18	0.14	<b>0.97</b>
<b>11</b> Shielding	0.80	1.11	0.43	0.71	0.22	<b>3.27</b>
<b>12</b> Instrument Infrastructure	0.32	0.42	0.29	0.38	0.25	<b>1.66</b>
<b>13</b> Vacuum	-	-	-	-	-	-
<b>14</b> PSS	0.12	0.07	0.12	0.11	0.09	<b>0.51</b>
<b>Totals</b>	<b>4.79</b>	<b>6.11</b>	<b>3.69</b>	<b>4.77</b>	<b>4.14</b>	<b>4.5+23.5</b>

**Table 3: Combined Budget, Cost**

WU	Cost Overview		Detailed Cost					Total
	Non-Labor	Labor	01 Management	02 Design	03 Procurem. Labor	04 Installation	05 Cold Com- missioning	
00 Phase 1	0 €	554,000 €	-	-	-	-	-	554,000 €
02 Neutron Transport	1,600,000 €	342,000 €	75,300 €	102,000 €	44,000 €	49,400 €	70,800 €	341,500 €
03 Heavy Shutter	175,000 €	173,000 €	40,700 €	58,400 €	15,900 €	33,300 €	24,600 €	173,000 €
04 T0 Chopper	170,000 €	115,000 €	25,900 €	40,100 €	14,000 €	15,100 €	19,400 €	114,500 €
05 Choppers	1,696,000 €	370,000 €	82,700 €	98,500 €	42,100 €	69,700 €	77,000 €	370,000 €
06 Cave Interior	730,000 €	428,000 €	96,200 €	81,300 €	73,100 €	81,800 €	95,400 €	427,800 €
07 Add ons	0 €	0 €	-	-	-	-	-	-
08 Motion Control and EE	102,000 €	266,000 €	55,500 €	59,600 €	41,200 €	62,600 €	47,200 €	266,100 €
09 White beam detectors	225,000 €	161,000 €	38,200 €	44,700 €	22,500 €	33,300 €	22,600 €	161,300 €
10 ToF Detectors	250,000 €	96,000 €	19,800 €	28,700 €	16,800 €	16,100 €	14,300 €	95,700 €
11 Shielding	2,265,000 €	360,000 €	98,700 €	127,200 €	40,200 €	71,700 €	22,600 €	360,400 €
12 Instrument Infrastructure	99,000 €	179,000 €	39,500 €	48,100 €	27,100 €	38,400 €	25,700 €	178,700 €
13 Vacuum	0 €	0 €	-	-	-	-	-	-
14 PSS	95,000 €	54,000 €	14,800 €	8,000 €	11,200 €	11,100 €	9,200 €	54,300 €
Travel	92,000 €	0 €	-	-	-	-	-	-
Contingency	750,000 €	254,000 €	58,700 €	69,700 €	34,900 €	48,200 €	42,900 €	254,400 €
<b>Totals</b>	<b>8,249,000 €</b>	<b>3,352,000 €</b>	<b>646,000 €</b>	<b>766,300 €</b>	<b>383,000 €</b>	<b>530,700 €</b>	<b>471,700 €</b>	<b>554,000 € + 2,797,700 €</b>
	<b>11,601,000 €</b>							

## 2.2. ESS Contribution

The tables below show the ESS contribution in man-years and cost, respectively.

**Table 4: ESS Sub-budget, Man-years**

	01 Management	02 Design	03 Procurem. Labor	04 Installation	05 Cold Com- missioning	Total
00 Phase 1	-	-	-	-	-	2.77
04 T0 Chopper	0.19	0.32	0.15	0.14	0.17	0.97
10 ToF Detectors	0.16	0.25	0.18	0.16	0.13	0.88
<b>Totals</b>	<b>0.35</b>	<b>0.57</b>	<b>0.33</b>	<b>0.30</b>	<b>0.30</b>	<b>2.77+1.85</b>

**Table 5: ESS Sub-budget, Cost**

WU	Cost Overview		Detailed Cost					Total
	Non-Labor	Labor	01 Management	02 Design	03 Procurem. Labor	04 Installation	05 Cold Com- missioning	
00 Phase 1	0 €	341,000 €	-	-	-	-	-	341,000 €
04 T0 Chopper	170,000 €	106,000 €	23,100 €	38,100 €	14,000 €	13,600 €	17,500 €	106,300 €
10 ToF Detectors	250,000 €	87,000 €	16,800 €	25,800 €	16,800 €	14,500 €	12,900 €	86,800 €
Travel	12,000 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
Contingency	43,000 €	19,000 €	3,900 €	6,200 €	3,100 €	2,800 €	3,000 €	19,000 €
<b>Totals</b>	<b>475,000 €</b>	<b>553,000 €</b>	<b>43,800 €</b>	<b>70,100 €</b>	<b>33,900 €</b>	<b>30,900 €</b>	<b>33,400 €</b>	<b>341,000 € + 212,100 €</b>
	<b>1,028,000 €</b>							

## 2.3. PSI Contribution

The tables below show the PSI contribution in man-years and cost, respectively.

**Table 6: PSI Sub-budget, Man-years**

	01 Management	02 Design	03 Procurem. Labor	04 Installation	05 Cold Com- missioning	Total
00 Phase 1	-	-	-	-	-	0.71
02 Neutron Transport	0.52	0.80	0.45	0.41	0.62	2.80
06 Cave Interior	0.66	0.64	0.77	0.73	0.84	3.64
09 White beam detectors	0.26	0.35	0.24	0.30	0.20	1.35
<b>Totals</b>	<b>1.44</b>	<b>1.79</b>	<b>1.46</b>	<b>1.44</b>	<b>1.66</b>	<b>0.71+7.79</b>

**Table 7: PSI Sub-budget, Cost**

WU	Cost Overview		Detailed Cost					Total
	Non-Labor	Labor	01 Management	02 Design	03 Procurem. Labor	04 Installation	05 Cold Com- missioning	
00 Phase 1	0 €	87,000 €	-	-	-	-	-	87,000 €
02 Neutron Transport	1,600,000 €	308,000 €	64,000 €	91,800 €	44,000 €	44,500 €	63,700 €	308,000 €
06 Cave Interior	730,000 €	388,000 €	81,800 €	73,200 €	73,100 €	73,600 €	85,900 €	387,600 €
09 White beam detectors	225,000 €	146,000 €	32,500 €	40,200 €	22,500 €	30,000 €	20,300 €	145,500 €
Travel	25,000 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
Contingency	258,000 €	84,000 €	17,800 €	20,500 €	14,000 €	14,800 €	17,000 €	84,100 €
<b>Totals</b>	<b>2,838,000 €</b>	<b>1,012,000 €</b>	<b>196,100 €</b>	<b>225,700 €</b>	<b>153,600 €</b>	<b>162,900 €</b>	<b>186,900 €</b>	<b>87,000 € + 925,200 €</b>
	<b>3,850,000 €</b>							



## 2.4. TUM Contribution

The tables below show the TUM contribution in man-years and cost, respectively. Please note that some labor cost associated with non-TUM work units is assumed in order to ensure proper integration throughout the project. The procurement cost of 4,435,000 € to 4,879,000 €, depending on the contingency used, may incur an additional VAT cost of 842,700 € to 926,900 €.

**Table 8: TUM Sub-budget, Man-years**

	<b>01</b> Management	<b>02</b> Design	<b>03</b> Procurem. Labor	<b>04</b> Installation	<b>05</b> Cold Com- missioning	<b>Total</b>
<b>00</b> Phase 1	-	-	-	-	-	<b>1.02</b>
<b>02</b> Neutron Transport	0.09	0.09	0.00	0.05	0.07	<b>0.30</b>
<b>03</b> Heavy Shutter	0.33	0.51	0.17	0.33	0.24	<b>1.58</b>
<b>04</b> T0 Chopper	0.02	0.02	0.00	0.02	0.02	<b>0.09</b>
<b>05</b> Choppers	0.67	0.86	0.45	0.69	0.71	<b>3.38</b>
<b>06</b> Cave Interior	0.12	0.07	0.00	0.08	0.09	<b>0.36</b>
<b>07</b> Add ons	0.00	0.00	0.00	0.00	0.00	<b>0.00</b>
<b>08</b> Motion Control and EE	0.45	0.52	0.44	0.62	0.46	<b>2.49</b>
<b>09</b> White beam detectors	0.05	0.04	0.00	0.03	0.02	<b>0.14</b>
<b>10</b> ToF Detectors	0.03	0.03	0.00	0.02	0.01	<b>0.09</b>
<b>11</b> Shielding	0.80	1.11	0.43	0.71	0.22	<b>3.27</b>
<b>12</b> Instrument Infrastructure	0.32	0.42	0.29	0.38	0.25	<b>1.66</b>
<b>14</b> PSS	0.12	0.07	0.12	0.11	0.09	<b>0.51</b>
<b>Totals</b>	<b>3.01</b>	<b>3.75</b>	<b>1.90</b>	<b>3.03</b>	<b>2.19</b>	<b>1.02+13.88</b>

**Table 9: TUM Sub-budget, Cost**

WU	Cost Overview		Detailed Cost					Total
	Non-Labor	Labor	01 Management	02 Design	03 Procurem. Labor	04 Installation	05 Cold Com- missioning	
00 Phase 1	0 €	126,000 €	-	-	-	-	-	126,000 €
02 Neutron Transport	0 €	34,000 €	11,300 €	10,200 €	0 €	4,900 €	7,100 €	33,500 €
03 Heavy Shutter	175,000 €	173,000 €	40,700 €	58,400 €	15,900 €	33,300 €	24,600 €	172,900 €
04 T0 Chopper	0 €	8,000 €	2,800 €	2,000 €	0 €	1,500 €	1,900 €	8,300 €
05 Choppers	1,696,000 €	370,000 €	82,700 €	98,500 €	42,100 €	69,700 €	77,000 €	370,000 €
06 Cave Interior	0 €	40,000 €	14,400 €	8,100 €	0 €	8,200 €	9,500 €	40,200 €
07 Add ons	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
08 Motion Control and EE	102,000 €	266,000 €	55,500 €	59,600 €	41,200 €	62,600 €	47,200 €	266,100 €
09 White beam detectors	0 €	16,000 €	5,700 €	4,500 €	0 €	3,300 €	2,300 €	15,800 €
10 ToF Detectors	0 €	9,000 €	3,000 €	2,900 €	0 €	1,600 €	1,400 €	8,900 €
11 Shielding	2,265,000 €	360,000 €	98,700 €	127,200 €	40,200 €	71,700 €	22,600 €	360,400 €
12 Instrument Infrastructure	99,000 €	179,000 €	39,500 €	48,100 €	27,100 €	38,400 €	25,700 €	178,700 €
14 PSS	95,000 €	54,000 €	14,800 €	8,000 €	11,200 €	11,100 €	9,200 €	54,300 €
Travel	55,000 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
Contingency	449,000 €	151,000 €	37,000 €	43,000 €	17,800 €	30,600 €	22,900 €	151,300 €
<b>Totals</b>	<b>4,936,000 €</b>	<b>1,786,000 €</b>	<b>406,100 €</b>	<b>470,500 €</b>	<b>195,500 €</b>	<b>336,900 €</b>	<b>251,400 €</b>	<b>126,000 € + 1,660,400 €</b>
	<b>6,722,000 €</b>							

## APPENDIX

Average travel cost estimate by salary groups. The resulting annual cost were used in Table 1.

Travel Destination	ESS HQ	Domestic	International	
Travel cost	800 €	500 €	1000 €	

  

Traveler (salary/h)	Annual Travel Frequency			Resulting Annual Cost
Director (100€)	1	2	0	1800 €
Lead (77€)	1	2	0	1800 €
Scientist (60€)	4	2	1	5200 €
PostDoc (48€)	1	2	0	1800 €