

**Budgetary cost estimate for 1.65m long modules components of  
Super FOFO MIDDLE AND TAIL END LATTICE ( Latice 2)**

E.L. Black  
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DESCRIPTION	UNITS	Qnt	\$/UNIT (1.65m)	SUBTOTAL MODULE	Qnt	MODULE EXTENDED \$	Uncertainty	COMMENTS
<b>RF/CENTER COIL ASSEMBLY</b>								
Vacuum Vessel w/support structure	Ass'y	1	\$29,335	\$29,335	1	\$29,335	40%	from FNAL & NC Products, Inc
<b>RF Cavity</b>								
Modulator & Tube	Ass'y	1	\$1,390,000	\$1,390,000	1	\$1,390,000	15%	
Cavity & Ancillary	Ass'y	1	\$422,000	\$422,000	1	\$422,000	15%	FNAL Alfred Moretti BD-BS PROTON SRC
System Integration			\$50,000	\$50,000	1	\$50,000		
<b>Center low field large bore Coil</b>	Ass'y	1	\$219,600	\$382,609	1	\$382,609	30%	John Miller, Magnet Science & Technology
Cryostat/shielding & vac. chamber	Ass'y	1	\$180,000	\$180,000	1	\$180,000		National High Magnetic Field Laboratory
<b>Integration Assembly labor</b>	MH	160	\$65	\$10,400	1	\$10,400		
				<b>\$2,435,009</b>		<b>\$2,435,009</b>	25%	
<b>Lh2 ABSORBER/COILS</b>								
Vacuum Vessel	Ass'y	1	\$16,550	\$16,550	1	\$16,550		
<b>LH2 Absorber Chamber</b>	Ass'y	1	\$47,000	\$47,000	1	\$47,000	20%	Gerhard Designing& manufacturing Inc
Manifold safety & Cooling	Ass'y	1	\$11,400	\$11,400	1	\$11,400	50%	For Convection & Forced flow
Lh2 Circulating Pump	Unit	1	\$30,350	\$30,350	1	\$30,350	10%	Barber-Nichols Inc.(Ref.: SMP-547) attached.
System Controls/Instrumentation	System	1	\$39,000	\$39,000	1	\$39,000		
<b>Higher-field Bucked Solenoids</b>	Ass'y	2	\$388,400	\$678,261	1	\$678,261	30%	John Miller, Magnet Science & Tech. NHMFL
Cryostat (for 2 bucked solenoids)	Ass'y	1	\$220,000	\$220,000	1	\$220,000		
<b>Integration Assembly labor</b>	MH	240	\$65	\$15,600	1	\$15,600		
				<b>\$1,058,161</b>		<b>\$1,058,161</b>	30%	
<b>Refrigeration</b>								
Liquid Helium	Liters	45	\$200	\$9,000	1	\$9,000	30%	Calculated based Hrs. of He flow through
Liquid Hydrogen	Liters	15	\$100	\$1,500	1	\$1,500		a heat exchanger
Refrigeration system		1	\$350,000	\$350,000	1	\$350,000		
				<b>\$360,500</b>		<b>\$360,500</b>		
<b>Ancillaries</b>								
Internal Supports		Lot	\$7,000	\$7,000	1	\$7,000		
Nuts bolts and seals		Lot	\$2,000	\$2,000	1	\$2,000		
Plumbing		Lot	\$2,333	\$2,333	1	\$2,333		
Vacuum System			\$9,333	\$9,333	1	\$9,333		
				<b>\$20,667</b>		<b>\$20,667</b>	10%	from E.Black IIT/FNAL
<b>Labor for final systems Integration</b>	MH	320	\$65	<b>\$20,800</b>	1	<b>\$20,800</b>		75% M/Hrs, millwrights, mechanical, electric 25% M/hrs, Design engineering
<b>TOTAL</b>				<b>\$3,924,471</b>		<b>\$3,895,136</b>		
<b>TOTAL LATTICE 2</b>			(averag cost)	<b>\$3,924,471</b>	<b>56</b>	<b>\$220,000,000</b>		(Rounded to the nerest 0.001%)