# 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 $ | Uncertanty | COMMENTS |
|---|---|---|---|---|---|---|---|---|
| **RF/CENTER COIL ASSEMBLY** | | | | | | | | |
| Vacuum Vessel w/support structure | Ass'y | 1 | $29,335 | $29,335 | 1 | $29,335 | 40% | from FNAL & NC Products, Inc |
| **RF Cavity** | | | | | | | | |
| 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 | | |
| **Center low field large bore Coil** | 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 |
| **Integration Assembly labor** | MH | 160 | $65 | $10,400 | 1 | $10,400 | | |
| | | | | **$2,435,009** | | **$2,435,009** | 25% | |
| **Lh2 ABSORBER/COILS** | | | | | | | | |
| Vacuum Vessel | Ass'y | 1 | $16,550 | $16,550 | 1 | $16,550 | | |
| **LH2 Absorber Chamber** | 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 | | |
| **Higher-field Bucked Solenoids** | 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 | | |
| **Integration Assembly labor** | MH | 240 | $65 | $15,600 | 1 | $15,600 | | |
| | | | | **$1,058,161** | | **$1,058,161** | 30% | |
| **Refrigeration** | | | | | | | | |
| 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 | | |
| | | | | **$360,500** | | **$360,500** | | |
| **Ancillaries** | | | | | | | | |
| 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 | | |
| | | | | **$20,667** | | **$20,667** | 10% | from E.Black IIT/FNAL |
| **Labor for final systems Integration** | MH | 320 | $65 | **$20,800** | 1 | **$20,800** | | 75% M/Hrs, millwrights, mechanical, electric |
| | | | | | | | | 25% M/hrs, Design engineering |
| **TOTAL** | | | | **$3,924,471** | | **$3,895,136** | | |
| **TOTAL LATTICE 2** | | | (averag cost) | **$3,924,471** | **56** | **$220,000,000** | | (Rounded to the nerest 0.001%) |