

IST cost, schedule, plans, report

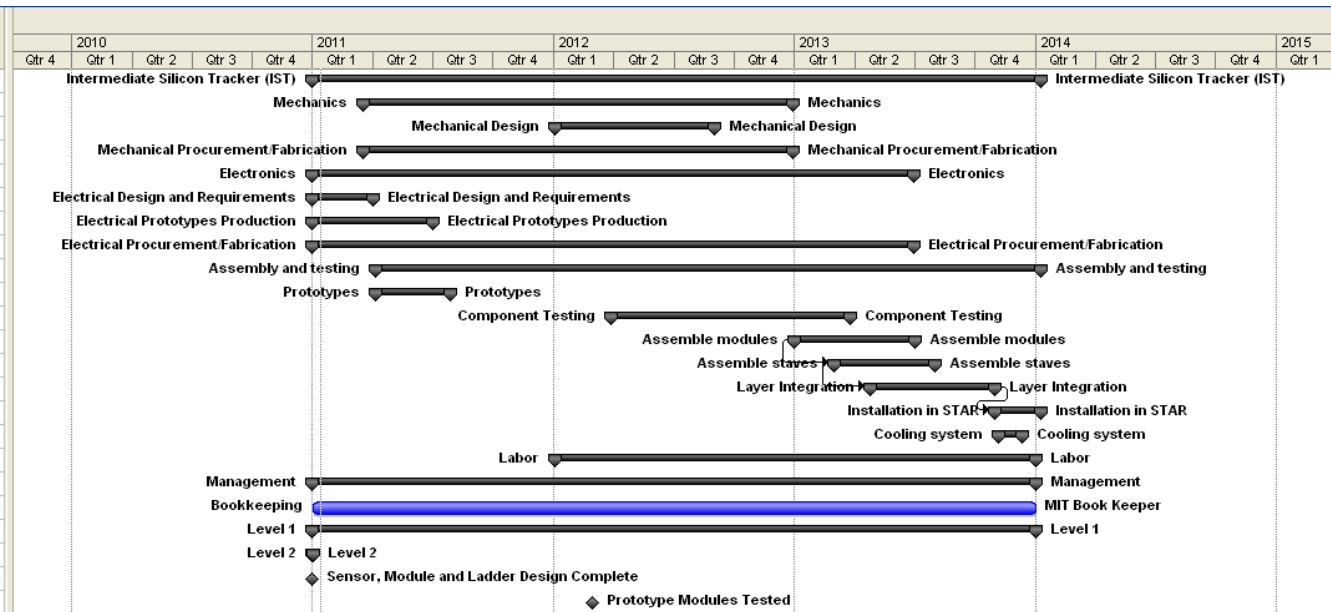
Gerrit van Nieuwenhuizen  
HFT-TC Quarterly Meeting  
BNL, October 14, 2010

# IST WBS: Cost

|     |  | WBS     | Task Name                                 | Start        | Finish       | Participating Institutions | Cost           | Redirected | Tech Risk | Cost Risk | Schedule Risk | Design Risk | Tech Weight | Cost weight | Calculated Contingency % | Calculated Contingency \$ | Base Cost + Contingency Cost |
|-----|--|---------|---|--------------|--------------|----------------------------|----------------|------------|-----------|-----------|---------------|-------------|-------------|-------------|--------------------------|---------------------------|------------------------------|
| 475 |  | 1.3     | Intermediate Silicon Tracker (IST)        | Fri 10/1/10  | Tue 10/8/13  | MIT                        | \$2,208,674.43 | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$446,412.81              | \$2,655,087.24               |
| 476 |  | 1.3.1   | Mechanics                                 | Thu 12/16/10 | Fri 9/28/12  | MIT                        | \$397,618.60   | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$130,944.20              | \$528,562.80                 |
| 477 |  | 1.3.1.1 | Mechanical Design                         | Mon 10/3/11  | Fri 6/1/12   | MIT                        | \$81,116.48    | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$26,964.24               | \$108,080.72                 |
| 481 |  | 1.3.1.3 | Mechanical Procurement/Fabrication        | Thu 12/16/10 | Fri 9/28/12  | MIT                        | \$316,502.12   | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$103,979.96              | \$420,482.08                 |
| 488 |  | 1.3.2   | Electronics                               | Fri 10/1/10  | Fri 3/29/13  | MIT                        | \$1,201,259.68 | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$315,468.61              | \$1,516,728.29               |
| 489 |  | 1.3.2.1 | Electrical Design and Requirements        | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$113,657.28   | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$40,916.62               | \$154,573.90                 |
| 505 |  | 1.3.2.2 | Electrical Prototypes Production          | Fri 10/1/10  | Fri 4/1/11   | MIT                        | \$125,300.00   | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$25,627.00               | \$150,927.00                 |
| 509 |  | 1.3.2.3 | Electrical Procurement/Fabrication        | Fri 10/1/10  | Fri 3/29/13  | MIT                        | \$962,302.40   | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$248,924.99              | \$1,211,227.39               |
| 530 |  | 1.3.3   | Assembly and testing                      | Wed 1/5/11   | Tue 10/8/13  | MIT                        | \$504,392.30   | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$504,392.30                 |
| 531 |  | 1.3.3.1 | Prototypes                                | Wed 1/5/11   | Tue 4/26/11  | MIT                        | \$20,236.80    | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$20,236.80                  |
| 535 |  | 1.3.3.2 | Component Testing                         | Tue 12/27/11 | Mon 12/24/12 | MIT                        | \$39,916.80    | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$39,916.80                  |
| 557 |  | 1.3.3.3 | Assemble modules                          | Mon 10/1/12  | Mon 4/1/13   | MIT                        | \$93,754.08    | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$93,754.08                  |
| 563 |  | 1.3.3.4 | Assemble staves                           | Thu 11/29/12 | Tue 4/30/13  | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 567 |  | 1.3.3.5 | Layer Integration                         | Thu 1/24/13  | Tue 7/30/13  | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 574 |  | 1.3.3.6 | Installation in STAR                      | Wed 7/31/13  | Tue 10/8/13  | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 577 |  | 1.3.3.7 | Cooling system                            | Wed 8/7/13   | Tue 9/10/13  | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 580 |  | 1.3.3.8 | Labor                                     | Mon 10/3/11  | Mon 9/30/13  | MIT                        | \$350,484.62   | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$350,484.62                 |
| 585 |  | 1.3.4   | Management                                | Fri 10/1/10  | Tue 10/1/13  | MIT                        | \$105,403.85   | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$105,403.85                 |
| 586 |  | 1.3.4.1 | Bookkeeping                               | Fri 10/1/10  | Tue 10/1/13  | MIT                        | \$105,403.85   | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$105,403.85                 |
| 587 |  | 1.3.4.2 | Level 1                                   | Fri 10/1/10  | Tue 10/1/13  | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 593 |  | 1.3.4.3 | Level 2                                   | Fri 10/1/10  | Fri 10/1/10  | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 602 |  | 1.3.5   | Sensor, Module and Ladder Design Complete | Fri 10/1/10  | Fri 10/1/10  | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 603 |  | 1.3.6   | Prototype Modules Tested                  | Wed 11/30/11 | Wed 11/30/11 | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |

# IST WBS:Schedule

| WBS     | Task Name                                 | Start        | Finish       |
|---------|---|--------------|--------------|
| 1.3     | Intermediate Silicon Tracker (IST)        | Fri 10/1/10  | Tue 10/8/13  |
| 1.3.1   | Mechanics                                 | Thu 12/16/10 | Fri 9/28/12  |
| 1.3.1.1 | Mechanical Design                         | Mon 10/3/11  | Fri 6/1/12   |
| 1.3.1.3 | Mechanical Procurement/Fabrication        | Thu 12/16/10 | Fri 9/28/12  |
| 1.3.2   | Electronics                               | Fri 10/1/10  | Fri 3/29/13  |
| 1.3.2.1 | Electrical Design and Requirements        | Fri 10/1/10  | Fri 12/31/10 |
| 1.3.2.2 | Electrical Prototypes Production          | Fri 10/1/10  | Fri 4/1/11   |
| 1.3.2.3 | Electrical Procurement/Fabrication        | Fri 10/1/10  | Fri 3/29/13  |
| 1.3.3   | Assembly and testing                      | Wed 1/5/11   | Tue 10/8/13  |
| 1.3.3.1 | Prototypes                                | Wed 1/5/11   | Tue 4/26/11  |
| 1.3.3.2 | Component Testing                         | Tue 12/27/11 | Mon 12/24/12 |
| 1.3.3.3 | Assemble modules                          | Mon 10/1/12  | Mon 4/1/13   |
| 1.3.3.4 | Assemble staves                           | Thu 11/29/12 | Tue 4/30/13  |
| 1.3.3.5 | Layer Integration                         | Thu 1/24/13  | Tue 7/30/13  |
| 1.3.3.6 | Installation in STAR                      | Wed 7/31/13  | Tue 10/8/13  |
| 1.3.3.7 | Cooling system                            | Wed 8/7/13   | Tue 9/10/13  |
| 1.3.3.8 | Labor                                     | Mon 10/3/11  | Mon 9/30/13  |
| 1.3.4   | Management                                | Fri 10/1/10  | Tue 10/1/13  |
| 1.3.4.1 | Bookkeeping                               | Fri 10/1/10  | Tue 10/1/13  |
| 1.3.4.2 | Level 1                                   | Fri 10/1/10  | Tue 10/1/13  |
| 1.3.4.3 | Level 2                                   | Fri 10/1/10  | Fri 10/1/10  |
| 1.3.5   | Sensor, Module and Ladder Design Complete | Fri 10/1/10  | Fri 10/1/10  |
| 1.3.6   | Prototype Modules Tested                  | Wed 11/30/11 | Wed 11/30/11 |



# IST WBS: Risk & Contingencies

|     |  | WBS         | Task Name                              | Start        | Finish       | Participating Institutions | Cost           | Redirected | Tech Risk | Cost Risk | Schedule Risk | Design Risk | Tech Weight | Cost weight | Calculated Contingency % | Calculated Contingency \$ | Base Cost + Contingency Cost |
|-----|--|-------------|--|--------------|--------------|----------------------------|----------------|------------|-----------|-----------|---------------|-------------|-------------|-------------|--------------------------|---------------------------|------------------------------|
| 475 |  | 1.3         | Intermediate Silicon Tracker (IST)     | Fri 10/1/10  | Tue 10/8/13  | MIT                        | \$2,185,901.79 | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$438,372.99              | \$2,624,274.78               |
| 476 |  | 1.3.1       | Mechanics                              | Mon 11/1/10  | Fri 9/28/12  | MIT                        | \$389,702.12   | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$128,252.59              | \$517,954.71                 |
| 477 |  | 1.3.1.1     | Mechanical Design                      | Mon 11/1/10  | Fri 6/1/12   | MIT                        | \$73,200.00    | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$24,272.63               | \$97,472.63                  |
| 478 |  | 1.3.1.1.4   | Support structure                      | Mon 10/3/11  | Fri 11/4/11  | MIT                        | \$34,964.00    | No         | 8         | 3         | 4             | 8           | 2           | 2           | 34                       | \$11,887.76               | \$46,851.76                  |
| 479 |  | 1.3.1.1.6   | Cooling system                         | Tue 4/3/12   | Fri 6/1/12   | MIT                        | \$30,768.32    | No         | 4         | 6         | 4             | 8           | 2           | 2           | 32                       | \$9,845.86                | \$40,614.18                  |
| 480 |  | 1.3.1.1.5   | Ladder                                 | Mon 11/1/10  | Tue 11/30/10 | MIT                        | \$7,467.68     | No         | 6         | 3         | 8             | 8           | 2           | 2           | 34                       | \$2,539.01                | \$10,006.69                  |
| 481 |  | 1.3.1.3     | Mechanical Procurement/Fabrication     | Thu 12/16/10 | Fri 9/28/12  | MIT                        | \$316,502.12   | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$103,979.96              | \$420,482.08                 |
| 482 |  | 1.3.1.3.6   | Prototype ladder                       | Thu 12/16/10 | Wed 3/9/11   | MIT                        | \$10,000.00    | No         | 1         | 4         | 4             | 0           | 2           | 1           | 10                       | \$1,000.00                | \$11,000.00                  |
| 483 |  | 1.3.1.3.1   | Support structure                      | Mon 11/7/11  | Fri 1/13/12  | MIT                        | \$50,000.00    | No         | 8         | 3         | 4             | 8           | 2           | 2           | 34                       | \$17,000.00               | \$67,000.00                  |
| 484 |  | 1.3.1.3.4   | Support structure production           | Mon 11/7/11  | Fri 1/13/12  | MIT                        | \$34,964.00    | No         | 8         | 3         | 4             | 8           | 2           | 2           | 34                       | \$11,887.76               | \$46,851.76                  |
| 485 |  | 1.3.1.3.2   | Cooling system                         | Mon 6/4/12   | Fri 8/24/12  | MIT                        | \$50,000.00    | No         | 4         | 6         | 4             | 8           | 2           | 2           | 32                       | \$16,000.00               | \$66,000.00                  |
| 486 |  | 1.3.1.3.5   | Cooling system production              | Mon 6/4/12   | Mon 9/3/12   | MIT                        | \$11,538.12    | No         | 4         | 6         | 4             | 8           | 2           | 2           | 32                       | \$3,692.20                | \$15,230.32                  |
| 487 |  | 1.3.1.3.3   | Ladders                                | Mon 10/3/11  | Fri 9/28/12  | MIT                        | \$160,000.00   | No         | 6         | 3         | 8             | 8           | 2           | 2           | 34                       | \$54,400.00               | \$214,400.00                 |
| 488 |  | 1.3.2       | Electronics                            | Fri 10/1/10  | Fri 3/29/13  | MIT                        | \$1,186,403.52 | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$310,120.40              | \$1,496,523.92               |
| 489 |  | 1.3.2.1     | Electrical Design and Requirements     | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$98,801.12    | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$35,568.40               | \$134,369.52                 |
| 490 |  | 1.3.2.1.1   | Sensors                                | Fri 10/1/10  | Fri 10/29/10 | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 491 |  | 1.3.2.1.2   | Readout Chips                          | Fri 10/1/10  | Fri 10/29/10 | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 492 |  | 1.3.2.1.3   | Flex hybrid                            | Fri 10/1/10  | Tue 11/30/10 | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 493 |  | 1.3.2.1.4   | Readout system                         | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$71,026.56    | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$25,569.56               | \$96,596.12                  |
| 494 |  | 1.3.2.1.4.1 | Crates                                 | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 495 |  | 1.3.2.1.4.2 | Data transmitters                      | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 496 |  | 1.3.2.1.4.3 | APV Readout Modules                    | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$71,026.56    | No         | 8         | 4         | 4             | 8           | 2           | 2           | 36                       | \$25,569.56               | \$96,596.12                  |
| 497 |  | 1.3.2.1.4.4 | APV Readout Controllers                | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 498 |  | 1.3.2.1.4.5 | Bias voltage supplies                  | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 499 |  | 1.3.2.1.5   | DAQ                                    | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 500 |  | 1.3.2.1.5.1 | Fibers                                 | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 501 |  | 1.3.2.1.5.2 | Data receivers                         | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 502 |  | 1.3.2.1.5.3 | Computers                              | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 503 |  | 1.3.2.1.6   | Slow Controls                          | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$0.00                    | \$0.00                       |
| 504 |  | 1.3.2.1.7   | On project labor                       | Fri 10/1/10  | Tue 11/30/10 | MIT                        | \$27,774.56    | No         | 8         | 4         | 4             | 8           | 2           | 2           | 36                       | \$9,998.84                | \$37,773.40                  |
| 505 |  | 1.3.2.2     | Electrical Prototypes Production       | Fri 10/1/10  | Fri 4/1/11   | MIT                        | \$125,300.00   | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$25,627.00               | \$150,927.00                 |
| 506 |  | 1.3.2.2.1   | Prototype sensor drawings and masks    | Fri 10/1/10  | Wed 12/1/10  | MIT                        | \$67,500.00    | No         | 4         | 3         | 8             | 0           | 2           | 1           | 19                       | \$12,825.00               | \$80,325.00                  |
| 507 |  | 1.3.2.2.2   | Prototype sensors production           | Thu 12/2/10  | Tue 3/1/11   | MIT                        | \$43,800.00    | No         | 4         | 3         | 8             | 0           | 2           | 1           | 19                       | \$8,322.00                | \$52,122.00                  |
| 508 |  | 1.3.2.2.3   | Prototype flex hybrid production       | Fri 10/1/10  | Fri 4/1/11   | MIT                        | \$14,000.00    | No         | 8         | 4         | 8             | 4           | 2           | 1           | 32                       | \$4,480.00                | \$18,480.00                  |
| 509 |  | 1.3.2.3     | Electrical Procurement/Fabrication     | Fri 10/1/10  | Fri 3/29/13  | MIT                        | \$962,302.40   | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$248,924.99              | \$1,211,227.39               |
| 510 |  | 1.3.2.3.1   | Sensors procurement                    | Mon 10/3/11  | Fri 9/28/12  | MIT                        | \$334,464.00   | No         | 4         | 3         | 8             | 0           | 2           | 1           | 19                       | \$63,548.16               | \$398,012.16                 |
| 511 |  | 1.3.2.3.3   | Readout Chips                          | Fri 10/1/10  | Fri 9/30/11  | MIT                        | \$30,000.00    | No         | 1         | 1         | 2             | 0           | 2           | 1           | 5                        | \$1,500.00                | \$31,500.00                  |
| 512 |  | 1.3.2.3.4   | Flex hybrid procurement                | Tue 10/4/11  | Tue 10/2/12  | MIT                        | \$230,400.00   | No         | 8         | 4         | 8             | 4           | 4           | 1           | 48                       | \$110,592.00              | \$340,992.00                 |
| 513 |  | 1.3.2.3.5   | Cables                                 | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$52,200.00    | No         | 0         | 0         | 0             | 0           | 0           | 0           | 0                        | \$7,308.00                | \$59,508.00                  |
| 514 |  | 1.3.2.3.5.1 | Signal cables inside field cage        | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$13,800.00    | No         | 1         | 4         | 4             | 4           | 2           | 1           | 14                       | \$1,932.00                | \$15,732.00                  |
| 515 |  | 1.3.2.3.5.2 | Signal cables outside field cage       | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$28,800.00    | No         | 1         | 4         | 4             | 4           | 2           | 1           | 14                       | \$4,032.00                | \$32,832.00                  |
| 516 |  | 1.3.2.3.5.3 | Bias voltage cables outside field cage | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$9,600.00     | No         | 1         | 4         | 4             | 4           | 2           | 1           | 14                       | \$1,344.00                | \$10,944.00                  |

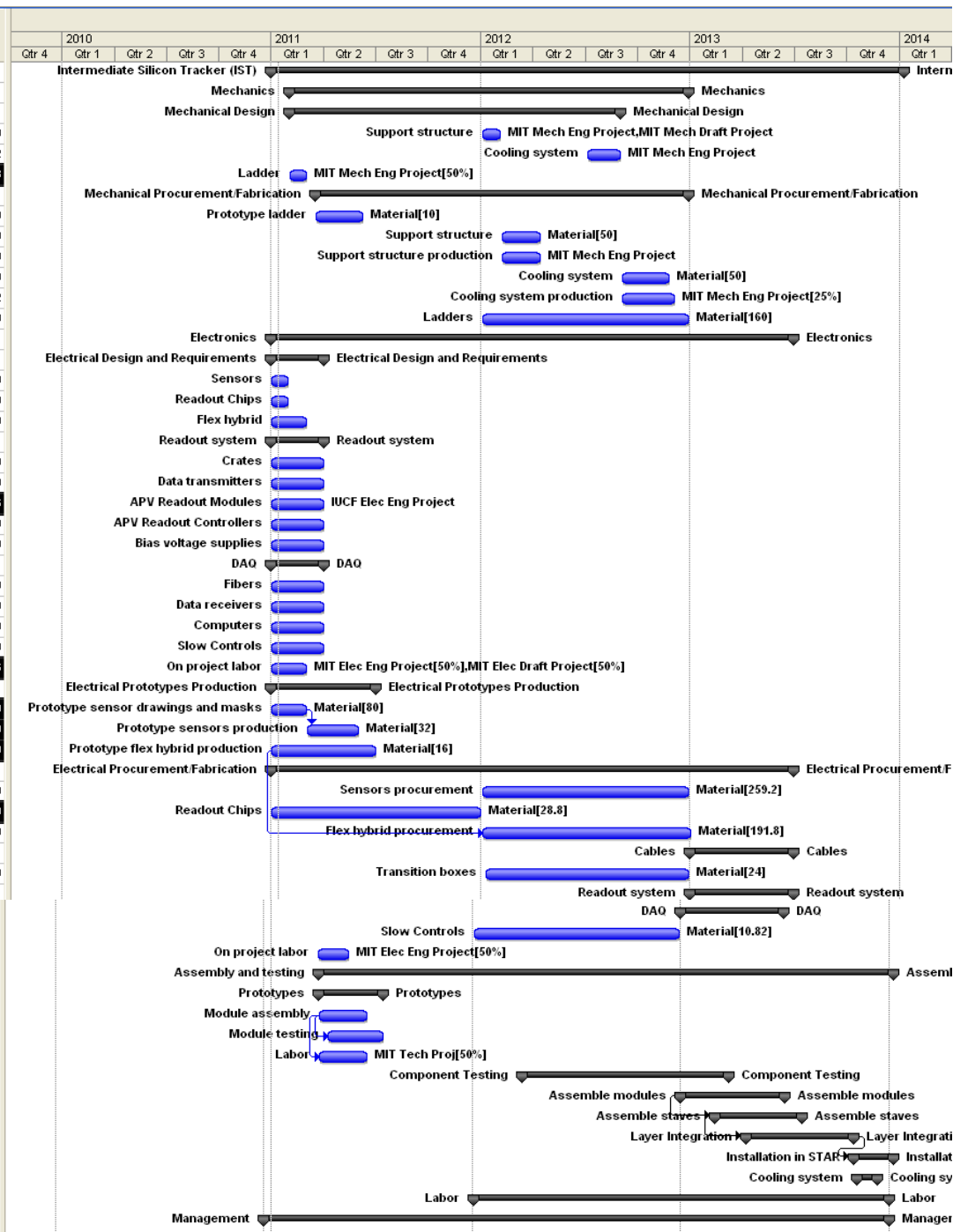
# IST WBS: Early critical path

| WBS | Task Name                                     | Start        | Finish       |
|-----|---|--------------|--------------|
| 475 | 1.3 Intermediate Silicon Tracker (IST)        | Fri 10/1/10  | Tue 10/8/13  |
| 476 | 1.3.1 Mechanics                               | Mon 11/1/10  | Fri 9/28/12  |
| 477 | 1.3.1.1 Mechanical Design                     | Mon 11/1/10  | Fri 6/1/12   |
| 478 | 1.3.1.1.4 Support structure                   | Mon 10/3/11  | Fri 11/4/11  |
| 479 | 1.3.1.1.6 Cooling system                      | Tue 4/3/12   | Fri 6/1/12   |
| 480 | 1.3.1.1.5 Ladder                              | Mon 11/1/10  | Tue 11/30/10 |
| 481 | 1.3.1.3 Mechanical Procurement/Fabrication    | Thu 12/16/10 | Fri 9/28/12  |
| 482 | 1.3.1.3.6 Prototype ladder                    | Thu 12/16/10 | Wed 3/9/11   |
| 483 | 1.3.1.3.1 Support structure                   | Mon 11/7/11  | Fri 1/13/12  |
| 484 | 1.3.1.3.4 Support structure production        | Mon 11/7/11  | Fri 1/13/12  |
| 485 | 1.3.1.3.2 Cooling system                      | Mon 6/4/12   | Fri 8/24/12  |
| 486 | 1.3.1.3.5 Cooling system production           | Mon 6/4/12   | Mon 9/3/12   |
| 487 | 1.3.1.3.3 Ladders                             | Mon 10/3/11  | Fri 9/28/12  |
| 488 | 1.3.2 Electronics                             | Fri 10/1/10  | Fri 3/29/13  |
| 489 | 1.3.2.1 Electrical Design and Requirements    | Fri 10/1/10  | Fri 12/31/10 |
| 490 | 1.3.2.1.1 Sensors                             | Fri 10/1/10  | Fri 10/29/10 |
| 491 | 1.3.2.1.2 Readout Chips                       | Fri 10/1/10  | Fri 10/29/10 |
| 492 | 1.3.2.1.3 Flex hybrid                         | Fri 10/1/10  | Tue 11/30/10 |
| 493 | 1.3.2.1.4 Readout system                      | Fri 10/1/10  | Fri 12/31/10 |
| 499 | 1.3.2.1.5 DAQ                                 | Fri 10/1/10  | Fri 12/31/10 |
| 503 | 1.3.2.1.6 Slow Controls                       | Fri 10/1/10  | Fri 12/31/10 |
| 504 | 1.3.2.1.7 On project labor                    | Fri 10/1/10  | Tue 11/30/10 |
| 505 | 1.3.2.2 Electrical Prototypes Production      | Fri 10/1/10  | Fri 4/1/11   |
| 506 | 1.3.2.2.1 Prototype sensor drawings and masks | Fri 10/1/10  | Wed 12/1/10  |
| 507 | 1.3.2.2.2 Prototype sensors production        | Thu 12/2/10  | Tue 3/1/11   |
| 508 | 1.3.2.2.3 Prototype flex hybrid production    | Fri 10/1/10  | Fri 4/1/11   |
| 509 | 1.3.2.3 Electrical Procurement/Fabrication    | Fri 10/1/10  | Fri 3/29/13  |
| 510 | 1.3.2.3.1 Sensors procurement                 | Mon 10/3/11  | Fri 9/28/12  |
| 511 | 1.3.2.3.3 Readout Chips                       | Fri 10/1/10  | Fri 9/30/11  |
| 512 | 1.3.2.3.4 Flex hybrid procurement             | Tue 10/4/11  | Tue 10/2/12  |
| 513 | 1.3.2.3.5 Cables                              | Mon 10/1/12  | Fri 3/29/13  |
| 517 | 1.3.2.3.6 Transition boxes                    | Mon 10/10/11 | Fri 9/28/12  |
| 518 | 1.3.2.3.7 Readout system                      | Mon 10/1/12  | Fri 3/29/13  |
| 524 | 1.3.2.3.8 DAQ                                 | Mon 10/1/12  | Fri 3/29/13  |
| 528 | 1.3.2.3.9 Slow Controls                       | Mon 10/3/11  | Fri 9/28/12  |
| 529 | 1.3.2.3.10 On project labor                   | Mon 1/3/11   | Fri 2/25/11  |
| 530 | 1.3.3 Assembly and testing                    | Wed 1/5/11   | Tue 10/8/13  |
| 531 | 1.3.3.1 Prototypes                            | Wed 1/5/11   | Tue 4/26/11  |
| 532 | 1.3.3.1.1 Module assembly                     | Wed 1/5/11   | Tue 3/29/11  |
| 533 | 1.3.3.1.2 Module testing                      | Wed 1/19/11  | Tue 4/26/11  |
| 534 | 1.3.3.1.3 Labor                               | Wed 1/5/11   | Tue 3/29/11  |



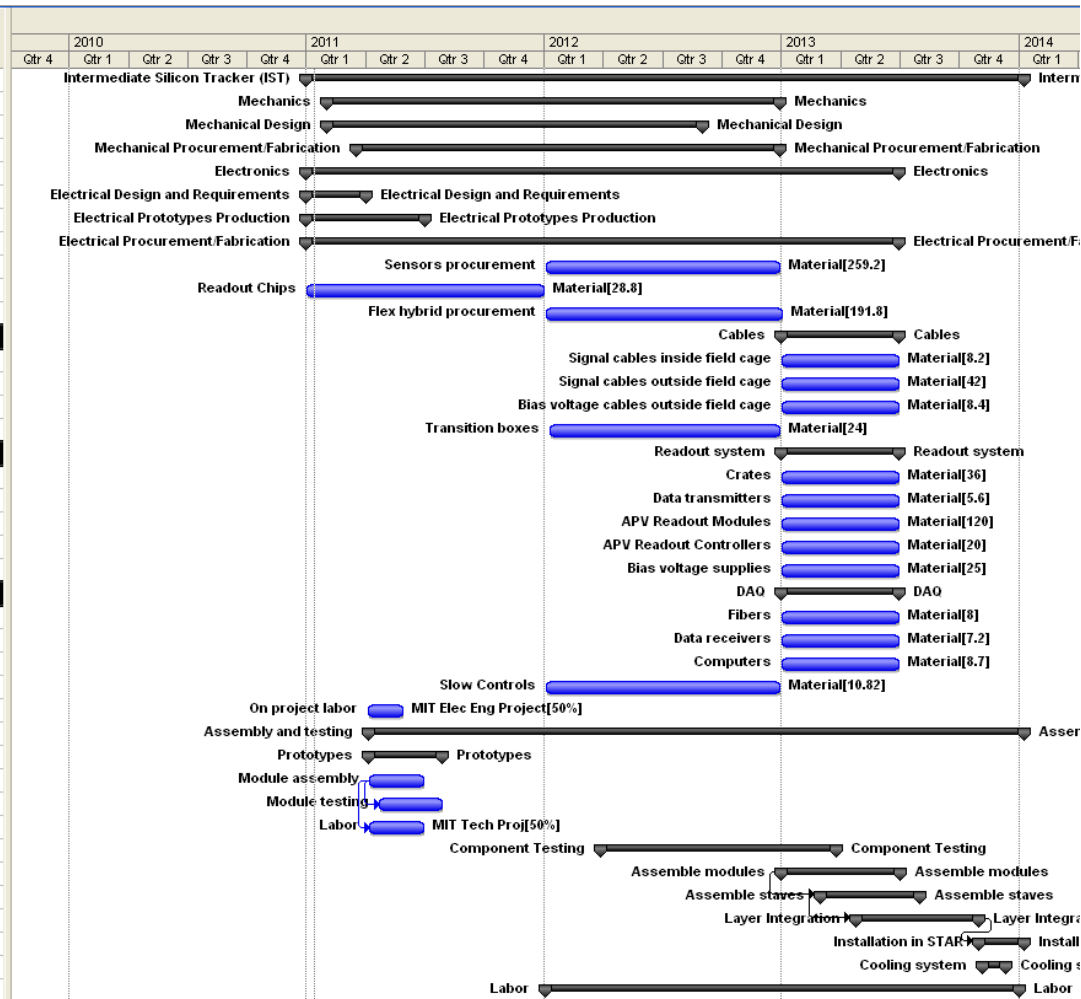
# IST WBS: Early cost, i.e. FYnow

| WBS | Task Name                                     | Start        | Finish       | Participating Institutions | Cost           |
|-----|---|--------------|--------------|----------------------------|----------------|
| 475 | 1.3 Intermediate Silicon Tracker (IST)        | Fri 10/1/10  | Tue 10/8/13  | MIT                        | \$2,185,901.79 |
| 476 | 1.3.1 Mechanics                               | Mon 11/1/10  | Fri 9/28/12  | MIT                        | \$389,702.12   |
| 477 | 1.3.1.1 Mechanical Design                     | Mon 11/1/10  | Fri 6/1/12   | MIT                        | \$73,200.00    |
| 478 | 1.3.1.1.4 Support structure                   | Mon 10/3/11  | Fri 11/4/11  | MIT                        | \$34,964.00    |
| 479 | 1.3.1.1.6 Cooling system                      | Tue 4/3/12   | Fri 6/1/12   | MIT                        | \$30,768.32    |
| 480 | 1.3.1.1.5 Ladder                              | Mon 11/1/10  | Tue 11/30/10 | MIT                        | \$7,467.68     |
| 481 | 1.3.1.3 Mechanical Procurement/Fabrication    | Thu 12/16/10 | Fri 9/28/12  | MIT                        | \$316,502.12   |
| 482 | 1.3.1.3.6 Prototype ladder                    | Thu 12/16/10 | Wed 3/9/11   | MIT                        | \$10,000.00    |
| 483 | 1.3.1.3.1 Support structure                   | Mon 11/7/11  | Fri 1/13/12  | MIT                        | \$50,000.00    |
| 484 | 1.3.1.3.4 Support structure production        | Mon 11/7/11  | Fri 1/13/12  | MIT                        | \$34,964.00    |
| 485 | 1.3.1.3.2 Cooling system                      | Mon 6/4/12   | Fri 8/24/12  | MIT                        | \$50,000.00    |
| 486 | 1.3.1.3.5 Cooling system production           | Mon 6/4/12   | Mon 9/3/12   | MIT                        | \$11,538.12    |
| 487 | 1.3.1.3.3 Ladders                             | Mon 10/3/11  | Fri 9/28/12  | MIT                        | \$160,000.00   |
| 488 | 1.3.2 Electronics                             | Fri 10/1/10  | Fri 3/29/13  | MIT                        | \$1,186,403.52 |
| 489 | 1.3.2.1 Electrical Design and Requirements    | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$98,801.12    |
| 490 | 1.3.2.1.1 Sensors                             | Fri 10/1/10  | Fri 10/29/10 | MIT                        | \$0.00         |
| 491 | 1.3.2.1.2 Readout Chips                       | Fri 10/1/10  | Fri 10/29/10 | MIT                        | \$0.00         |
| 492 | 1.3.2.1.3 Flex hybrid                         | Fri 10/1/10  | Tue 11/30/10 | MIT                        | \$0.00         |
| 493 | 1.3.2.1.4 Readout system                      | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$71,026.56    |
| 494 | 1.3.2.1.4.1 Crates                            | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         |
| 495 | 1.3.2.1.4.2 Data transmitters                 | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         |
| 496 | 1.3.2.1.4.3 APV Readout Modules               | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$71,026.56    |
| 497 | 1.3.2.1.4.4 APV Readout Controllers           | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         |
| 498 | 1.3.2.1.4.5 Bias voltage supplies             | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         |
| 499 | 1.3.2.1.5 DAO                                 | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         |
| 500 | 1.3.2.1.5.1 Fibers                            | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         |
| 501 | 1.3.2.1.5.2 Data receivers                    | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         |
| 502 | 1.3.2.1.5.3 Computers                         | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         |
| 503 | 1.3.2.1.6 Slow Controls                       | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$0.00         |
| 504 | 1.3.2.1.7 On project labor                    | Fri 10/1/10  | Tue 11/30/10 | MIT                        | \$27,774.56    |
| 505 | 1.3.2.2 Electrical Prototypes Production      | Fri 10/1/10  | Fri 4/1/11   | MIT                        | \$125,300.00   |
| 506 | 1.3.2.2.1 Prototype sensor drawings and masks | Fri 10/1/10  | Wed 12/1/10  | MIT                        | \$67,500.00    |
| 507 | 1.3.2.2.2 Prototype sensors production        | Thu 12/2/10  | Tue 3/1/11   | MIT                        | \$43,800.00    |
| 508 | 1.3.2.2.3 Prototype flex hybrid production    | Fri 10/1/10  | Fri 4/1/11   | MIT                        | \$14,000.00    |
| 509 | 1.3.2.3 Electrical Procurement/Fabrication    | Fri 10/1/10  | Fri 3/29/13  | MIT                        | \$962,302.40   |
| 510 | 1.3.2.3.1 Sensors procurement                 | Mon 10/3/11  | Fri 9/28/12  | MIT                        | \$334,464.00   |
| 511 | 1.3.2.3.3 Readout Chips                       | Fri 10/1/10  | Fri 9/30/11  | MIT                        | \$30,000.00    |
| 512 | 1.3.2.3.4 Flex hybrid procurement             | Tue 10/4/11  | Tue 10/2/12  | MIT                        | \$230,400.00   |
| 513 | 1.3.2.3.5 Cables                              | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$52,200.00    |
| 517 | 1.3.2.3.6 Transition boxes                    | Mon 10/1/11  | Fri 9/28/12  | MIT                        | \$24,000.00    |
| 518 | 1.3.2.3.7 Readout system                      | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$243,600.00   |
| 524 | 1.3.2.3.8 DAO                                 | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$23,900.00    |
| 526 | 1.3.2.3.9 Slow Controls                       | Mon 10/3/11  | Fri 9/28/12  | MIT                        | \$10,820.00    |
| 529 | 1.3.2.3.10 On project labor                   | Mon 1/3/11   | Fri 2/25/11  | MIT                        | \$12,918.40    |
| 530 | 1.3.3 Assembly and testing                    | Wed 1/5/11   | Tue 10/8/13  | MIT                        | \$504,392.30   |
| 531 | 1.3.3.1 Prototypes                            | Wed 1/5/11   | Tue 4/26/11  | MIT                        | \$20,236.80    |
| 532 | 1.3.3.1.1 Module assembly                     | Wed 1/5/11   | Tue 3/29/11  | MIT                        | \$0.00         |
| 533 | 1.3.3.1.2 Module testing                      | Wed 1/19/11  | Tue 4/26/11  | MIT                        | \$0.00         |
| 534 | 1.3.3.1.3 Labor                               | Wed 1/5/11   | Tue 3/29/11  | MIT                        | \$20,236.80    |
| 535 | 1.3.3.2 Component Testing                     | Tue 12/27/11 | Mon 12/24/12 | MIT                        | \$39,916.80    |
| 557 | 1.3.3.3 Assemble modules                      | Mon 10/1/12  | Mon 4/1/13   | MIT                        | \$93,754.08    |
| 563 | 1.3.3.4 Assemble staves                       | Thu 11/29/12 | Tue 4/30/13  | MIT                        | \$0.00         |
| 567 | 1.3.3.5 Layer Integration                     | Thu 1/24/13  | Tue 7/30/13  | MIT                        | \$0.00         |
| 574 | 1.3.3.6 Installation in STAR                  | Wed 7/31/13  | Tue 10/8/13  | MIT                        | \$0.00         |
| 577 | 1.3.3.7 Cooling system                        | Wed 8/7/13   | Tue 9/10/13  | MIT                        | \$0.00         |
| 580 | 1.3.3.8 Labor                                 | Mon 10/3/11  | Mon 9/30/13  | MIT                        | \$350,484.62   |
| 585 | 1.3.4 Management                              | Fri 10/1/10  | Tue 10/1/13  | MIT                        | \$105,403.85   |



# IST WBS: FY12 redistribution

| WBS | Task Name  | Start        | Finish       | Participating Institutions | Cost           |
|-----|--|--------------|--------------|----------------------------|----------------|
| 475 | 1.3 Intermediate Silicon Tracker (IST)             | Fri 10/1/10  | Tue 10/8/13  | MIT                        | \$2,185,901.79 |
| 476 | 1.3.1 Mechanics                                    | Mon 11/1/10  | Fri 9/28/12  | MIT                        | \$389,702.12   |
| 477 | 1.3.1.1 Mechanical Design                          | Mon 11/1/10  | Fri 6/1/12   | MIT                        | \$73,200.00    |
| 481 | 1.3.1.3 Mechanical Procurement/Fabrication         | Thu 12/16/10 | Fri 9/28/12  | MIT                        | \$316,502.12   |
| 488 | 1.3.2 Electronics                                  | Fri 10/1/10  | Fri 3/29/13  | MIT                        | \$1,186,403.52 |
| 489 | 1.3.2.1 Electrical Design and Requirements         | Fri 10/1/10  | Fri 12/31/10 | MIT                        | \$98,801.12    |
| 505 | 1.3.2.2 Electrical Prototypes Production           | Fri 10/1/10  | Fri 4/1/11   | MIT                        | \$125,300.00   |
| 509 | 1.3.2.3 Electrical Procurement/Fabrication         | Fri 10/1/10  | Fri 3/29/13  | MIT                        | \$962,302.40   |
| 510 | 1.3.2.3.1 Sensors procurement                      | Mon 10/3/11  | Fri 9/28/12  | MIT                        | \$334,464.00   |
| 511 | 1.3.2.3.3 Readout Chips                            | Fri 10/1/10  | Fri 9/30/11  | MIT                        | \$30,000.00    |
| 512 | 1.3.2.3.4 Flex hybrid procurement                  | Tue 10/4/11  | Tue 10/2/12  | MIT                        | \$230,400.00   |
| 513 | 1.3.2.3.5 Cables                                   | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$52,200.00    |
| 514 | 1.3.2.3.5.1 Signal cables inside field cage        | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$13,800.00    |
| 515 | 1.3.2.3.5.2 Signal cables outside field cage       | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$28,800.00    |
| 516 | 1.3.2.3.5.3 Bias voltage cables outside field cage | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$9,600.00     |
| 517 | 1.3.2.3.6 Transition boxes                         | Mon 10/10/11 | Fri 9/28/12  | MIT                        | \$24,000.00    |
| 518 | 1.3.2.3.7 Readout system                           | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$243,600.00   |
| 519 | 1.3.2.3.7.1 Crates                                 | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$48,000.00    |
| 520 | 1.3.2.3.7.2 Data transmitters                      | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$5,600.00     |
| 521 | 1.3.2.3.7.3 APV Readout Modules                    | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$120,000.00   |
| 522 | 1.3.2.3.7.4 APV Readout Controllers                | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$20,000.00    |
| 523 | 1.3.2.3.7.5 Bias voltage supplies                  | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$50,000.00    |
| 524 | 1.3.2.3.8 DAQ                                      | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$23,900.00    |
| 525 | 1.3.2.3.8.1 Fibers                                 | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$8,000.00     |
| 526 | 1.3.2.3.8.2 Data receivers                         | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$7,200.00     |
| 527 | 1.3.2.3.8.3 Computers                              | Mon 10/1/12  | Fri 3/29/13  | MIT                        | \$8,700.00     |
| 528 | 1.3.2.3.9 Slow Controls                            | Mon 10/3/11  | Fri 9/28/12  | MIT                        | \$10,820.00    |
| 529 | 1.3.2.3.10 On project labor                        | Mon 1/3/11   | Fri 2/25/11  | MIT                        | \$12,918.40    |
| 530 | 1.3.3 Assembly and testing                         | Wed 1/5/11   | Tue 10/8/13  | MIT                        | \$504,392.30   |
| 531 | 1.3.3.1 Prototypes                                 | Wed 1/5/11   | Tue 4/26/11  | MIT                        | \$20,236.80    |
| 532 | 1.3.3.1.1 Module assembly                          | Wed 1/5/11   | Tue 3/29/11  | MIT                        | \$0.00         |
| 533 | 1.3.3.1.2 Module testing                           | Wed 1/19/11  | Tue 4/26/11  | MIT                        | \$0.00         |
| 534 | 1.3.3.1.3 Labor                                    | Wed 1/5/11   | Tue 3/29/11  | MIT                        | \$20,236.80    |
| 535 | 1.3.3.2 Component Testing                          | Tue 12/27/11 | Mon 12/24/12 | MIT                        | \$39,916.80    |
| 557 | 1.3.3.3 Assemble modules                           | Mon 10/1/12  | Mon 4/1/13   | MIT                        | \$93,754.08    |
| 563 | 1.3.3.4 Assemble staves                            | Thu 11/29/12 | Tue 4/30/13  | MIT                        | \$0.00         |
| 567 | 1.3.3.5 Layer Integration                          | Thu 1/24/13  | Tue 7/30/13  | MIT                        | \$0.00         |
| 574 | 1.3.3.6 Installation in STAR                       | Wed 7/31/13  | Tue 10/8/13  | MIT                        | \$0.00         |
| 577 | 1.3.3.7 Cooling system                             | Wed 8/7/13   | Tue 9/10/13  | MIT                        | \$0.00         |
| 580 | 1.3.3.8 Labor                                      | Mon 10/3/11  | Mon 9/30/13  | MIT                        | \$350,484.62   |



# IST: Scope change => plans

- 1 hybrid per ladder instead of 3
- laminate hybrid directly to ladder
- no more 'curling' modules
- simpler and less cables
  
- proof of principle lamination
- ladder mechanical and bonding tests
- large hybrid design/production
- 6 sensor ladder prototype by May 2011



# IST: Tech report October

A quotation has been received for a dummy large IST hybrid. This dummy should closely mimic the real large hybrid of which the design has not been finished yet. It should have the same number of kapton layers, realistic copper traces and bondable gold in designated areas. The dummy will be laminated to a prototype IST ladder to study the feasibility of this process and to determine if reliable wire bonding is possible to the assembly. This step should be done as soon as possible to be able to finalize the large hybrid and ladder design. Unfortunately the quotation came out a bit higher than expected for a pretty much blank dummy and other vendors are being contacted.

The specifications of the IST sensors were discussed in person with the local Hamamatsu representative, no issues were found. The rough estimate of a 6 month prototype production was reconfirmed. The representative did warn for a slight price increase due to less favorable yen-dollar exchange rates.

The testing of the APV readout chips is ongoing with both the IST pre-prototype and the FGT readout boards. Although the FGT is a different project, it shares an almost identical readout chain with the IST. Because of higher priorities for the FGT project there is a delay in the writing of the calibration code for the IST test readout of the pre-prototype. Hopefully this will be finished in October. The issues with unreliable I2C seem to have been resolved by issuing a hard reset when the APV chips get powered up. Grounding studies are done for the FGT readout boards using the analysis code developed for the IST pre-prototype.

# IST: Tech report October

The IST readout system consists of an Wiener MPod crates, APV Readout Modules (ARM's) and APV Readout Controllers (ARC's). The first ARC's, which accept STAR triggers and provide the interface between DAQ and the ARM's, have been produced and testing will begin shortly.

The full design of the ARM has to be finalized still. However, the interfacing with the APV front-ends through a long readout cable is being tested successfully already. This interface provides power to the APV chips but also does optimal filtering of the signals which get distorted by the long signal cable. The first prototypes for the ARM are expected before the end of CY2010.

To be able to test a simple readout chain (APV board, cable and readout crate with ARM's and ARC's) during STAR operation this year cables were already installed in STAR.