

WBS	Name
1	Fluorescence Detector
1.1	FD System
1.1.1	Optics
1.1.1.1	Mirror System
1.1.1.1.1	Mirror System (EA)
1.1.1.1.1.1	Mirror Support
1.1.1.1.1.1.1	Design
1.1.1.1.1.1.2	Procure Materials
1.1.1.1.1.1.3	Fabricate
1.1.1.1.1.1.4	Galvanize
1.1.1.1.1.2	Mirror Segments
1.1.1.1.1.2.1	Specify
1.1.1.1.1.2.2	Procure Glass
1.1.1.1.1.2.3	Inspect/Test Glass
1.1.1.1.1.2.4	Cut Glass to Shape
1.1.1.1.1.2.5	Aluminize Glass
1.1.1.1.1.2.6	Test Aluminizing
1.1.1.1.1.3	Pre-assembly/Testing
1.1.1.1.1.3.1	Erect Mirror Assembly
1.1.1.1.1.3.2	Align Mirrors
1.1.1.1.1.3.3	Perform Focal Plain Test
1.1.1.1.1.3.4	Disassemble
1.1.1.1.1.4	Documentation
1.1.1.1.1.4.1	Generate Assembly Instructions
1.1.1.1.1.4.2	Generate Maintenance Instructions
1.1.1.1.1.5	Shipping
1.1.1.1.1.5.1	Pack/Ship Mirror Assembly to Site
1.1.1.1.1.5.2	Receive/Inspect Mirror Assembly at Site
1.1.1.1.2	Mirror System (Prod.)
1.1.1.1.2.1	Production Alternative Prototype Mirror System
1.1.1.1.2.1.1	Mirror Segments
1.1.1.1.2.1.1.1	Design
1.1.1.1.2.1.1.2	Procure Materials
1.1.1.1.2.1.1.3	Fabricate
1.1.1.1.2.1.1.4	Test
1.1.1.1.2.1.2	Mirror Mounts
1.1.1.1.2.1.2.1	Design
1.1.1.1.2.1.2.2	Procure Materials
1.1.1.1.2.1.2.3	Fabricate

WBS	Name
1.1.1.1.2.1.3	Mirror Support Structure
1.1.1.1.2.1.3.1	Design
1.1.1.1.2.1.3.2	Procure Materials
1.1.1.1.2.1.3.3	Fabricate
1.1.1.1.2.1.4	Mirror Mount Alignment Kit
1.1.1.1.2.1.4.1	Specify
1.1.1.1.2.1.4.2	Procure Materials
1.1.1.1.2.1.4.3	Fabricate
1.1.1.1.2.1.5	Installation/Maintenance Tool Kits
1.1.1.1.2.1.5.1	Specify
1.1.1.1.2.1.5.2	Procure
1.1.1.1.2.1.6	Mirror Mounting Scaffolding
1.1.1.1.2.1.6.1	Design
1.1.1.1.2.1.6.2	Procure
1.1.1.1.2.1.7	Mirror Test Laboratory Equipment
1.1.1.1.2.1.7.1	Specify
1.1.1.1.2.1.7.2	Procure
1.1.1.1.2.1.7.3	Assemble
1.1.1.1.2.1.8	Pre-assemble/Testing
1.1.1.1.2.1.8.1	Erect Mirror Assembly
1.1.1.1.2.1.8.2	Align Mirrors
1.1.1.1.2.1.8.3	Perform Focal Plain Test
1.1.1.1.2.1.8.4	Disassemble
1.1.1.1.2.1.9	Documentation
1.1.1.1.2.1.9.1	Generate Assembly Instructions
1.1.1.1.2.1.9.2	Generate Maintenance Instructions
1.1.1.1.2.1.9.3	Collect/Index Specs. and Drawings
1.1.1.1.2.1.10	Shipping
1.1.1.1.2.1.10.1	Pack/Ship Mirror Assembly to Site
1.1.1.1.2.1.10.2	Receive/Inspect Mirror Assembly at Site
1.1.1.1.2.2	Final Production Mirror System
1.1.1.1.2.2.1	Mirror Supports
1.1.1.1.2.2.1.1	Procure Materials
1.1.1.1.2.2.1.2	Fabricate
1.1.1.1.2.2.2	Mirror Segments
1.1.1.1.2.2.2.1	Procure Materials
1.1.1.1.2.2.2.2	Fabricate
1.1.1.1.2.2.2.3	Test
1.1.1.1.2.1.9	Documentation

WBS	Name
1.1.1.1.2.1.9.1	Generate Assembly Instructions
1.1.1.1.2.1.9.2	Generate Maintenance Instructions
1.1.1.1.2.1.9.3	Collect/Index Specs. and Drawings
1.1.1.1.2.2.4	Shipping
1.1.1.1.2.2.4.1	Pack/Ship Mirror Assembly to Site
1.1.1.1.2.2.4.2	Receive/Inspect Mirror Assembly at Site
1.1.1.2	Diaphragm
1.1.1.2.1	Diaphragm (EA)
1.1.1.2.1.1	Reference Point/Stand
1.1.1.2.1.1.1	Design
1.1.1.2.1.1.2	Procure Materials
1.1.1.2.1.1.3	Fabricate
1.1.1.2.1.2	Optical Filter
1.1.1.2.1.2.1	Specify Filter Glass
1.1.1.2.1.2.2	Procure Glass Materials
1.1.1.2.1.2.3	Design Filter Frame
1.1.1.2.1.2.4	Fabricate Optical Filter
1.1.1.2.1.2.5	Ship To FZK-IK
1.1.1.2.1.3	Emergency Shutter
1.1.1.2.1.3.1	Specify
1.1.1.2.1.3.2	Procure
1.1.1.2.1.4	Diaphragm Support Structure
1.1.1.2.1.4.1	Design
1.1.1.2.1.4.2	Procure Materials
1.1.1.2.1.4.3	Fabricate
1.1.1.2.1.5	External Shutter
1.1.1.2.1.5.1	Design
1.1.1.2.1.5.2	Procure Materials
1.1.1.2.1.5.3	Fabricate
1.1.1.2.1.5.4	Ship To FZK-IK
1.1.1.2.1.6	Diaphragm Window
1.1.1.2.1.6.1	Design
1.1.1.2.1.6.2	Procure
1.1.1.2.1.7	Diaphragm Compartment
1.1.1.2.1.7.1	Design
1.1.1.2.1.7.2	Procure Materials
1.1.1.2.1.7.3	Fabricate
1.1.1.2.1.8	Reflective Screen
1.1.1.2.1.8.1	Specify

WBS	Name
1.1.1.2.1.8.2	Procure
1.1.1.2.1.8.3	Ship To FZK-IK
1.1.1.2.1.9	Diaphragm Corrector Lens
1.1.1.2.1.9.1	Design
1.1.1.2.1.9.2	Procure Materials
1.1.1.2.1.9.3	Fabricate
1.1.1.2.1.10	Aperture Mask
1.1.1.2.1.10.1	Design
1.1.1.2.1.10.2	Procure Materials
1.1.1.2.1.10.3	Fabricate
1.1.1.2.1.11	Pre-assembly/Testing
1.1.1.2.1.11.1	Erect Diaphragm Assembly
1.1.1.2.1.11.2	Test Diaphragm Assembly
1.1.1.2.1.11.3	Disassemble Diaphragm Assembly
1.1.1.2.1.12	Special Tool Kit for Installation and Maintenance
1.1.1.2.1.12.1	Specify
1.1.1.2.1.12.2	Procure Materials
1.1.1.2.1.13	Documentation
1.1.1.2.1.13.1	Generate Assembly Instructions
1.1.1.2.1.13.2	Generate Operation/Maintenance Instructions
1.1.1.2.1.13.3	Collect/Index Specs. and Drawings
1.1.1.2.1.14	Shipping
1.1.1.2.1.14.1	Pack/Ship Diaphragm Assembly to Site
1.1.1.2.1.14.2	Receive/Inspect Diaphragm Assembly at Site
1.1.1.2.2	Diaphragm (Prod.)
1.1.1.2.2.1	Reference Point/Stand
1.1.1.2.2.2	Optical Filter
1.1.1.2.2.3	Emergency Shutter
1.1.1.2.2.4	Diaphragm Support Structure
1.1.1.2.2.5	External Shutter
1.1.1.2.2.6	Diaphragm Window
1.1.1.2.2.7	Diaphragm Compartment
1.1.1.2.2.8	Reflective Screen
1.1.1.2.2.9	Diaphragm Corrector Lens
1.1.1.2.2.10	Aperture Mask
1.1.1.2.2.11	Documentation
1.1.1.2.2.11.1	Generate Assembly Instructions
1.1.1.2.2.11.2	Generate Operation/Maintenance Instructions
1.1.1.2.2.11.3	Collect/Index Specs. and Drawings

WBS	Name
1.1.1.2.2.12	Shipping
1.1.1.2.2.12.1	Pack/Ship Diaphragm Assembly to Site
1.1.1.2.2.12.2	Receive/Inspect Diaphragm Assembly at Site
1.1.2	Camera
1.1.2.1	Camera (EA)
1.1.2.1.1	Camera Body
1.1.2.1.1.1	Design
1.1.2.1.1.2	Fabricate
1.1.2.1.1.3	Ship to Roma
1.1.2.1.2	Camera Support
1.1.2.1.2.1	Design
1.1.2.1.2.2	Fabricate
1.1.2.1.2.3	Ship to Roma
1.1.2.1.3	PMT
1.1.2.1.3.1	Procure
1.1.2.1.3.2	Install Head Electronics
1.1.2.1.3.3	Test PMTs
1.1.2.1.3.4	Ship PMT to Site
1.1.2.1.3.5	Receive/Inspect at Site
1.1.2.1.3.6	Evaluate/Modify Design for Production
1.1.2.1.4	Mercedes
1.1.2.1.4.1	Design
1.1.2.1.4.2	Procure
1.1.2.1.4.3	Install Mylar
1.1.2.1.4.4	Ship to Site
1.1.2.1.4.5	Receive/Inspect at Site
1.1.2.1.4.6	Evaluate/Modify Design for Production
1.1.2.1.5	Distribution Board
1.1.2.1.5.1	Design
1.1.2.1.5.2	Fabricate
1.1.2.1.5.3	Test
1.1.2.1.5.4	Redesign
1.1.2.1.5.5	Fabricate
1.1.2.1.5.6	Test
1.1.2.1.5.7	Ship to Site
1.1.2.1.5.8	Receive/Inspect at Site
1.1.2.1.5.9	Evaluate/Modify Design for Production
1.1.2.1.6	Cables - Distribution Board to Analog Board & Distribution Board
1.1.2.1.6.1	Specify

WBS	Name
1.1.2.1.6.2	Procure
1.1.2.1.6.3	Test Sample
1.1.2.1.6.4	Ship to Site
1.1.2.1.6.5	Receive/Inspect at Site
1.1.2.1.6.6	Evaluate/Modify Design for Production
1.1.2.1.7	Integration & Test
1.1.2.1.7.1	Sunflower Test
1.1.2.1.7.2	100 Channel Test
1.1.2.1.7.3	Full Camera Test
1.1.2.1.8	Shipping
1.1.2.1.8.1	Pack/Ship Camera Assembly to Site
1.1.2.1.8.2	Receive/Inspect Camera Assembly at Site
1.1.2.2	Cameras (Prod.)
1.1.2.2.1	Camera Body
1.1.2.2.2	Camera Support
1.1.2.2.3	PMT
1.1.2.2.4	Mercedes
1.1.2.2.5	Distribution Board
1.1.2.2.6	Cables - Distribution Board to Analog Board & Distribution Board to H
1.1.2.2.7	Shipping
1.1.3	Calibration
1.1.3.1	Calibration
1.1.3.1.1	Detector
1.1.3.1.1.1	Relative
1.1.3.1.1.1.1	Central Eye
1.1.3.1.1.1.2	Flat Screen Calibration
1.1.3.1.1.1.3	R-Calibration Database
1.1.3.1.1.2	Absolute
1.1.3.1.1.2.1	Absolute Calibration Facility
1.1.3.1.1.2.2	Roving and Unimpeachable PMTs
1.1.3.1.1.2.3	"2p" Light Source(s)
1.1.3.1.1.2.4	Absolute Calibration Light Detector(s)
1.1.3.1.1.2.5	A-Calibration Database
1.1.3.1.1.3	Atmospheric Monitoring
1.1.3.1.1.3.1	Lidar
1.1.3.1.1.3.2	Flasher
1.1.3.1.1.3.3	Horizontal Attenuation
1.1.3.1.1.3.4	Star Monitor
1.1.3.1.1.3.5	Phase Function

WBS	Name
1.1.3.1.1.3.6	Cloud Monitor
1.1.3.1.1.3.7	Weather Station
1.1.3.1.1.3.8	Atmospheric Calibration Data Base
1.1.3.1.1.3.9	Roving Laser
1.1.3.1.1.4	Central Computer Software System
1.1.3.2	Calibration (Prod.)
1.1.3.2.1	Detector
1.1.3.2.1.1	Relative
1.1.3.2.1.1.1	Central Eye
1.1.3.2.1.1.2	Flat Screen Calibration
1.1.3.2.1.1.3	R-Calibration Database
1.1.3.2.1.2	Absolute
1.1.3.2.1.2.1	Absolute Calibration Facility
1.1.3.2.1.2.2	Roving and Unimpeachable PMTs
1.1.3.2.1.2.3	"2p" Light Source(s)
1.1.3.2.1.2.4	Absolute Calibration Light Detector(s)
1.1.3.2.1.2.5	A-Calibration Database
1.1.3.2.1.3	Atmospheric Monitoring
1.1.3.2.1.3.1	Lidar
1.1.3.2.1.3.2	Flasher
1.1.3.2.1.3.3	Horizontal Attenuation
1.1.3.2.1.3.4	Star Monitor
1.1.3.2.1.3.5	Phase Function
1.1.3.2.1.3.6	Cloud Monitor
1.1.3.2.1.3.7	Weather Station
1.1.3.2.1.3.8	Atmospheric Calibration Data Base
1.1.3.2.1.3.9	Roving Laser
1.1.3.2.1.4	Central Computer Software System
1.1.4	Infrastructure
1.1.4.1	Los Leones (EA)
1.1.4.1.1	Site Network
1.1.4.1.1.1	Specify
1.1.4.1.1.2	Procure
1.1.4.1.1.3	Ship to Site
1.1.4.2	Los Coihueco (Prod.)
1.1.4.3	Los Morales (Prod.)
1.1.4.4	Los Atuel (Prod.)
1.1.5	Integration and Testing
1.1.5.1	Integration and Testing (EA)

WBS	Name
1.1.5.1.1	Test & Evaluation
1.1.5.1.1.1	Coordinate Sunflower Test
1.1.5.1.1.2	Coordinate 100 Channel Test
1.1.5.1.1.3	Coordinate Full Camera Test
1.1.5.1.1.4	Assembly EA Telescope
1.1.5.1.1.4.1	Install Diaphragm
1.1.5.1.1.4.2	Install Mirror
1.1.5.1.1.4.3	Install Camera
1.1.5.1.1.4.4	Install Slow Control
1.1.5.1.1.5	Commission
1.1.5.1.1.5.1	Develop Commissioning Plan
1.1.5.1.1.5.2	Perform Commissioning
1.1.5.1.1.6	Data Collection and Assessment
1.1.5.1.1.6.1	Collect EA Operational and Maintenance Data
1.1.5.1.1.6.2	Evaluate EA Data and Finalize Production Design
1.1.5.2	Integration and Testing (Prod.)
1.1.5.2.1	Test & Evaluation
1.1.5.2.2	Assembly EA Telescope
1.1.5.2.2.1	Install Diaphragm
1.1.5.2.2.2	Install Mirror
1.1.5.2.2.3	Install Camera
1.1.5.2.2.4	Install Slow Control
1.1.5.2.3	Commission
1.1.5.2.3.1	Develop Commissioning Plan
1.1.5.2.3.2	Perform Commissioning
1.2	FD Electronics
1.2.1	Computing Facility
1.2.1.1	Computing Facility at Los Leones (EA)
1.2.1.1.1	FD Computing Facility at Los Leones
1.2.1.1.1.1	Eye PC (1 per eye)
1.2.1.1.1.2	Mirror PC (1 per telescope)
1.2.1.1.1.3	Network Switches (2 per eye)
1.2.1.1.1.4	Network - LAN (1 per eye)
1.2.1.1.2	FD Computing Facility at Central Camput
1.2.1.1.2.1	FD-Slow Control Server
1.2.1.1.2.1.1	Specify
1.2.1.1.2.1.2	Procure
1.2.1.1.2.1.3	Ship to Site
1.2.1.1.2.2	FD-EYE Server

WBS	Name
1.2.1.1.2.2.1	Specify
1.2.1.1.2.2.2	Procure
1.2.1.1.2.2.3	Ship to Site
1.2.1.2	FD Computing Facility (Prod.)
1.2.1.2.1	FD Computing Facility at Los Leones for Production
1.2.1.2.1.1	Mirror PC (1 per telescope)
1.2.1.2.2	FD Computing Facility at Atuel
1.2.1.2.2.1	Eye PC (1 per eye)
1.2.1.2.2.2	Mirror PC (1 per telescope)
1.2.1.2.2.3	Network Switches (2 per eye)
1.2.1.2.2.4	Network - LAN (1 per eye)
1.2.1.2.3	FD Computing Facility at Los Coihuecco
1.2.1.2.3.1	Eye PC (1 per eye)
1.2.1.2.3.2	Mirror PC (1 per telescope)
1.2.1.2.3.3	Network Switches (2 per eye)
1.2.1.2.3.4	Network - LAN (1 per eye)
1.2.1.2.4	FD Computing Facility at Los Morados
1.2.1.2.4.1	Eye PC (1 per eye)
1.2.1.2.4.2	Mirror PC (1 per telescope)
1.2.1.2.4.3	Network Switches (2 per eye)
1.2.1.2.4.4	Network - LAN (1 per eye)
1.2.2	Hardware
1.2.2.1	Hardware (EA)
1.2.2.1.1	Head Electronics
1.2.2.1.1.1	Design Head Electronics Prototype
1.2.2.1.1.2	Fabricate Head Electronics Prototypes (150)
1.2.2.1.1.3	Ship Head Electronics Prototypes to Roma
1.2.2.1.1.4	Fabricate Remaining Head Electronics for EA Camera
1.2.2.1.1.5	Test Remaining Head Electronics for EA Camera
1.2.2.1.1.6	Ship Remaining Head Electronics for EA Camera to Roma
1.2.2.1.2	Analog Front-end Board
1.2.2.1.2.1	Design Front-end Board
1.2.2.1.2.2	Fabricate Prototype Boards
1.2.2.1.2.3	Perform integration test w/German Digital Interface Board
1.2.2.1.2.4	Finalize Front-end Board Design
1.2.2.1.2.5	Fabricate EA Front-end Boards (20)
1.2.2.1.2.6	Test Front-end Boards
1.2.2.1.2.7	Ship Front-end Boards to HPE for Integration
1.2.2.1.3	1st Level Trigger Board

WBS	Name
1.2.2.1.4	2nd Level Trigger Board
1.2.2.1.5	Interface Board
1.2.2.1.6	Clock Module
1.2.2.1.7	High Voltage Power Supplies
1.2.2.1.7.1	Specify
1.2.2.1.7.2	Procure
1.2.2.1.7.3	Test
1.2.2.1.7.4	Ship to Roma
1.2.2.1.8	Low Voltage Power Supplies
1.2.2.1.8.1	Low Voltage for Head Electronics
1.2.2.1.8.1.1	Specify
1.2.2.1.8.1.2	Procure
1.2.2.1.8.1.3	Test
1.2.2.1.8.1.4	Ship to Roma
1.2.2.1.8.2	Low Voltage for Crate
1.2.2.1.9	Crate
1.2.2.2	Hardware (Prod.)
1.2.2.2.1	Head Electronics
1.2.2.2.2	Analog Front-end Board
1.2.2.2.3	1st Level Trigger Board
1.2.2.2.4	2nd Level Trigger Board
1.2.2.2.5	Interface Board
1.2.2.2.6	Clock Module
1.2.2.2.7	High Voltage Power Supplies
1.2.2.2.8	Low Voltage Power Supplies
1.2.2.2.8.1	Low Voltage for Head Electronics
1.2.2.2.8.2	Low Voltage for Crate
1.2.2.2.9	Crate
1.2.3	Software
1.2.3.1	Software (EA)
1.2.3.1.1	Hardware Level Software
1.2.3.1.2	Data Acquisition
1.2.3.1.3	Third Level Trigger
1.2.3.1.4	Event Building
1.2.3.1.5	Data Analysis
1.2.3.1.6	GUI
1.2.3.1.7	Software Integration
1.2.3.1.8	Test Software
1.2.3.1.9	Electronics Alignment Software

WBS	Name
1.2.3.1.10	Monitoring Software
1.2.3.1.11	Calibration Software
1.2.3.1.12	Documentation
1.2.3.2	Software (Prod.)
1.2.3.2.1	Hardware Level Software
1.2.3.2.2	Data Acquisition
1.2.3.2.3	Third Level Trigger
1.2.3.2.4	Event Building
1.2.3.2.5	Data Analysis
1.2.3.2.6	GUI
1.2.3.2.7	Software Integration
1.2.3.2.8	Test Software
1.2.3.2.9	Electronics Alignment Software
1.2.3.2.10	Monitoring Software
1.2.3.2.11	Calibration Software
1.2.3.2.12	Documentation
1.2.4	Slow Control
1.2.4.1	Slow Control (EA)
1.2.4.1.1	Hardware (Sensors & Remote Control)
1.2.4.1.2	Software (To Drive Sensors)
1.2.4.1.3	Integration/Testing
1.2.4.1.4	Documentation
1.2.4.2	Slow Control (Prod.)
1.2.4.2.1	Hardware (Sensors & Remote Control)
1.2.4.2.2	Software (To Drive Sensors)
1.2.4.2.3	Integration/Testing
1.2.4.2.4	Documentation