

# APF Light Source Status

Auger Collaboration Meeting

Malargue, Argentina

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1. APF light source geometry
2. Installation status
3. Data taking plans ... **need Coihueco FD**
4. Data analysis plans

# APF Source at Coihueco

N ↑

Control PC at  
Coihueco

Communications  
via serial  
radio link



$d_{\perp} \sim 250\text{m}$



3 (selectable) light beams:  
330 nm, 360 nm, 390 nm

Triggered on "GPS second" + fixed  
offsets

Light source  
~1.3 km from  
Coihueco

NO moving parts (other than relay)

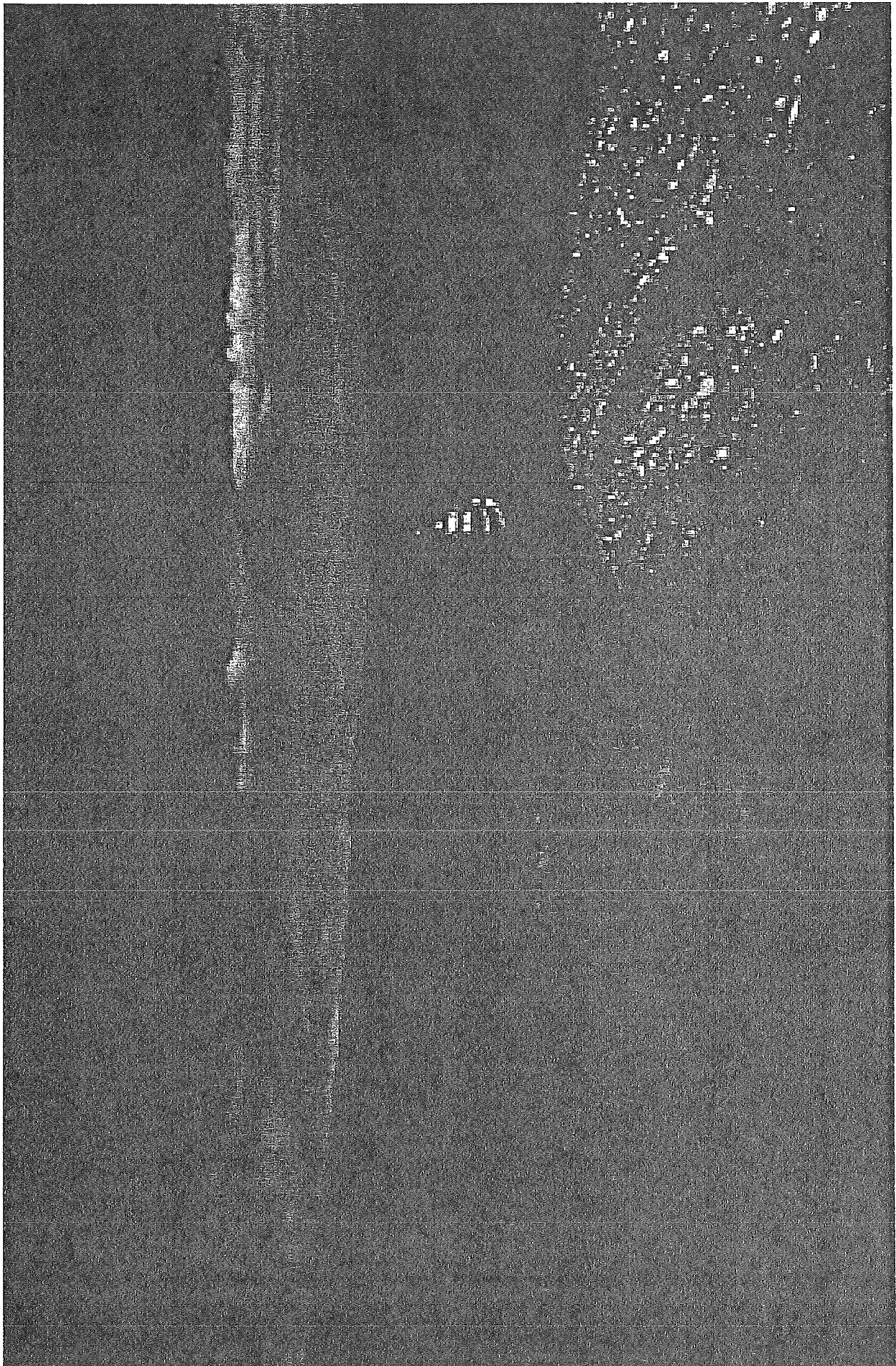
## 2 ~ 4: APF Light Source

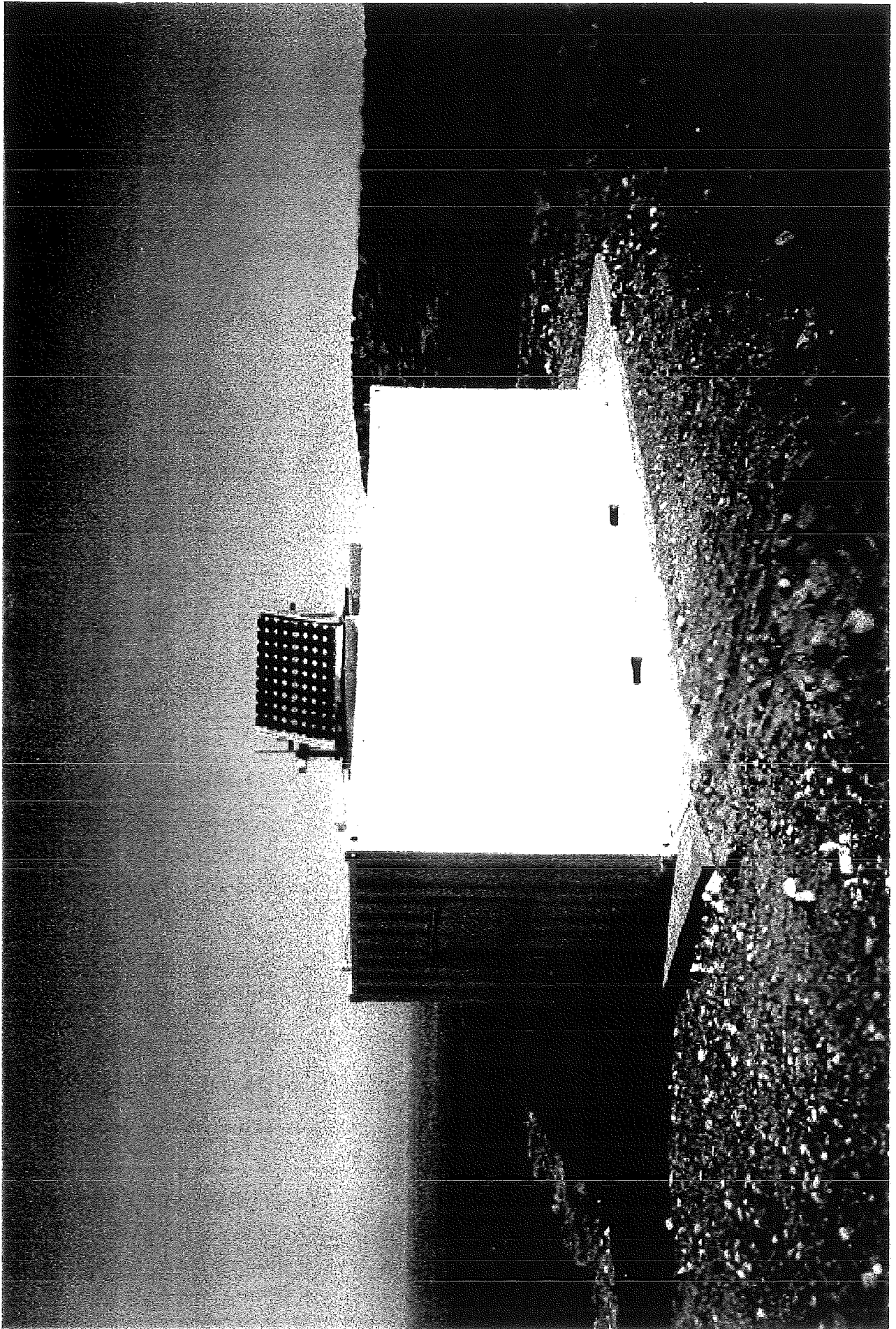
### 2. Installation:

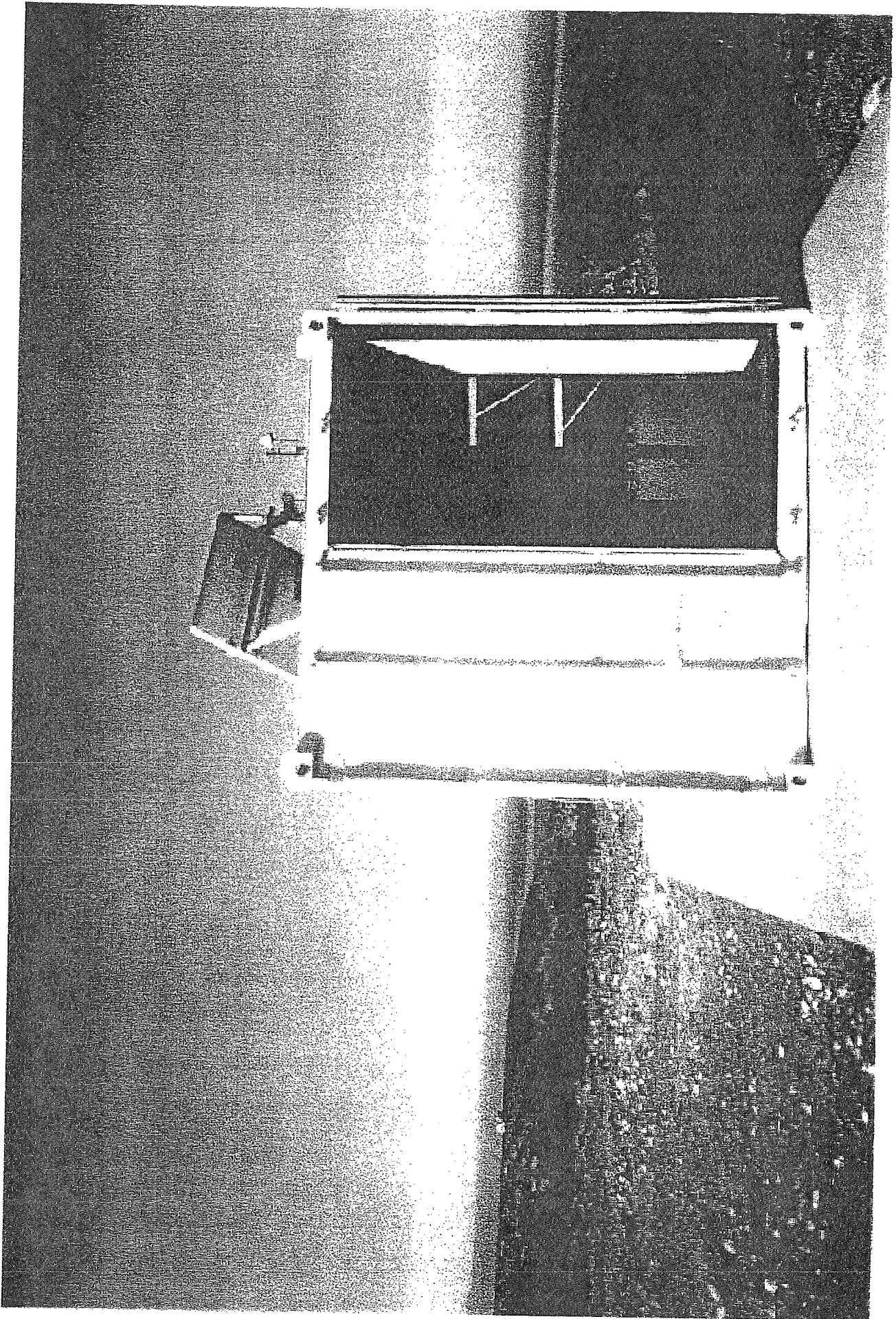
- All components are installed at the site 1.3km SW of Coihueco
- Final alignment of each source to be done
- All components have been exercised: locally and from Coihueco *via* dedicated *APF* serial radio link
- Control software needs work ...

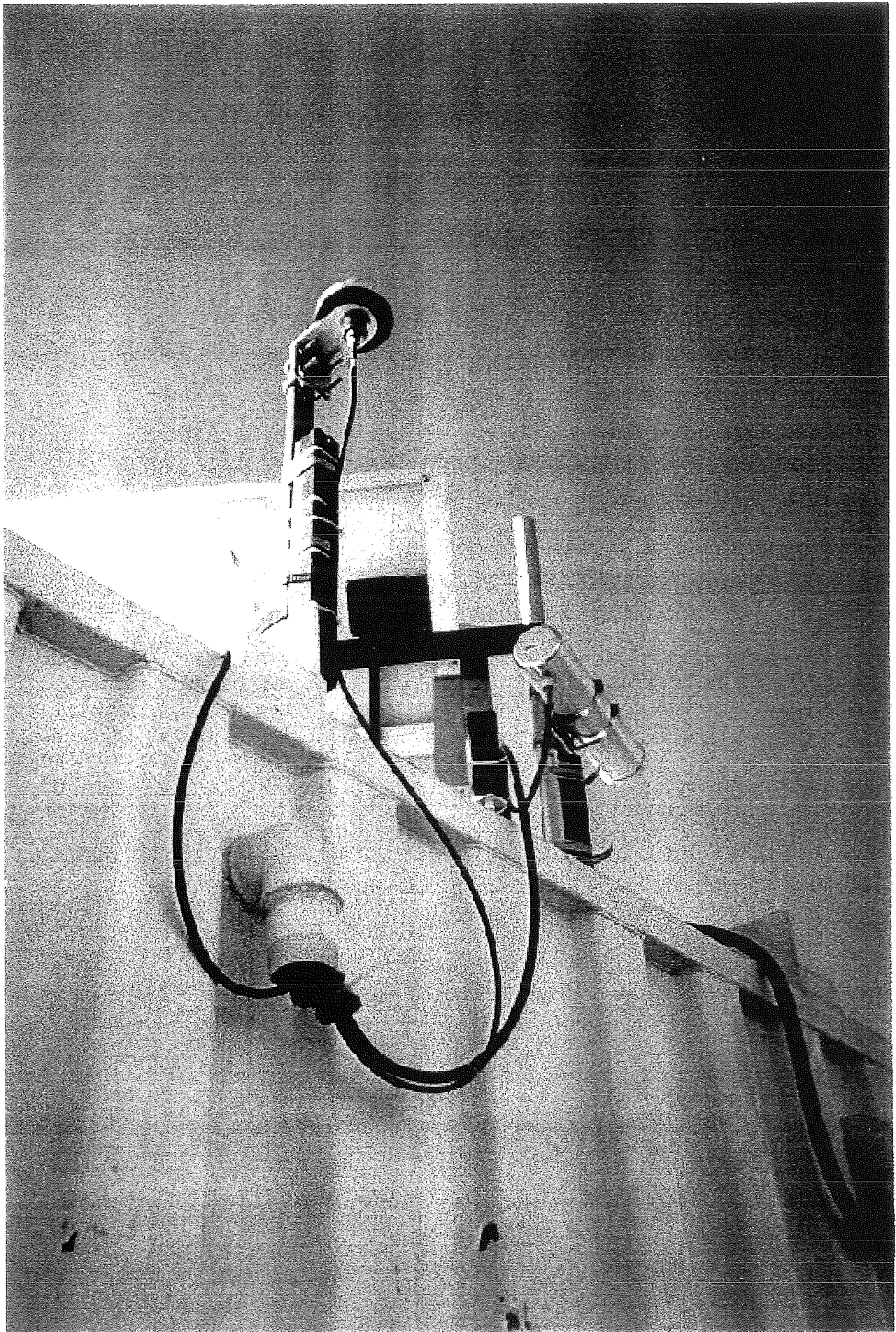
### 3. Data taking plans ... *need Coihueco FD:*

- Some number of APF light pulses will be produced at the beginning of each hour (of FD operation)
- Potentially 1/wavelength is sufficient but 10/wavelength improves the average signal and provides cross checks.
- The APF light pulses must trigger all 6 Coihueco telescopes
- APF pulses are at a fixed offset from the GPS second
- APF light pulses should be flagged as *APF events* and extracted to a monitoring data stream
- Events should be analyzed at the the central site









## SPECIFICATIONS

### Transceiver

Frequency	2.400 - 2.4835GHz license-free ISM band in U.S. (varies in other countries where Zeus Transceivers have been certified)
Radio Type	Frequency Hopping Spread Spectrum
Number of Channels	417 independent, non-interfering frequencies
Data Rate	600bps to 9.6kbps full duplex, up to 19.2kbps asymmetrical
Indoor Range	Up to 1,500 feet (457m) in normal construction
Outdoor Range	Up to 2 miles (3.2km) with omni-directional antenna Up to 12 miles (19.3km) with optional directional antenna (line of sight to the horizon)
Protocol	CSMA (Carrier Sense Multiple Access)
Flow Control	Supports Hardware, Software, or None
Error Detection & Correction	CRC 16 error detection; forward error correction can correct errors in 1 out of every 4 bits transmitted
Warranty	1 year parts and labor
Certifications	FCC Part 15 Certified, Industry Canada, Japan, Europe (ETSI), and Brazil. Other international certifications pending.
Power Modes	Normal, Doze, and Sleep

### Electrical

Electrical Interface	RS232C Voltage Levels
Input Power	Shipped with a 115 VAC power adapter providing: Voltage: > 6.5 V and < 9.0 V (6.5 to 32 Volts if Wide Input model) Ripple: Less than 250 mV (RMS) from DC to 1 MHz
Input Current Draw	idle: 200mA Transmit: 550mA instantaneous current Transmit/Receive (time averaged over 100msec):360mA
Transmit Power Output	10mW to 500mW nominal, self-adjusting (lower maximum power output where required)

### Environmental

Temperature Range	-4°F to +140°F (-20°C to +60°C). -40°C model also available
Humidity	0% to 95% (non-condensing)

### Physical

Dimensions	1.3 inches height (33mm) x 3.8 inches width (97mm) x 5.2 inches length (132mm)
Weight	8.1 ounces (230 grams)
Interface Requirements	Standard RS232C DB-9 (female) connector
Antennas	Omni-directional (up to 5dBi) with reverse thread connector Directional (up to 16dBi) with reverse thread connector

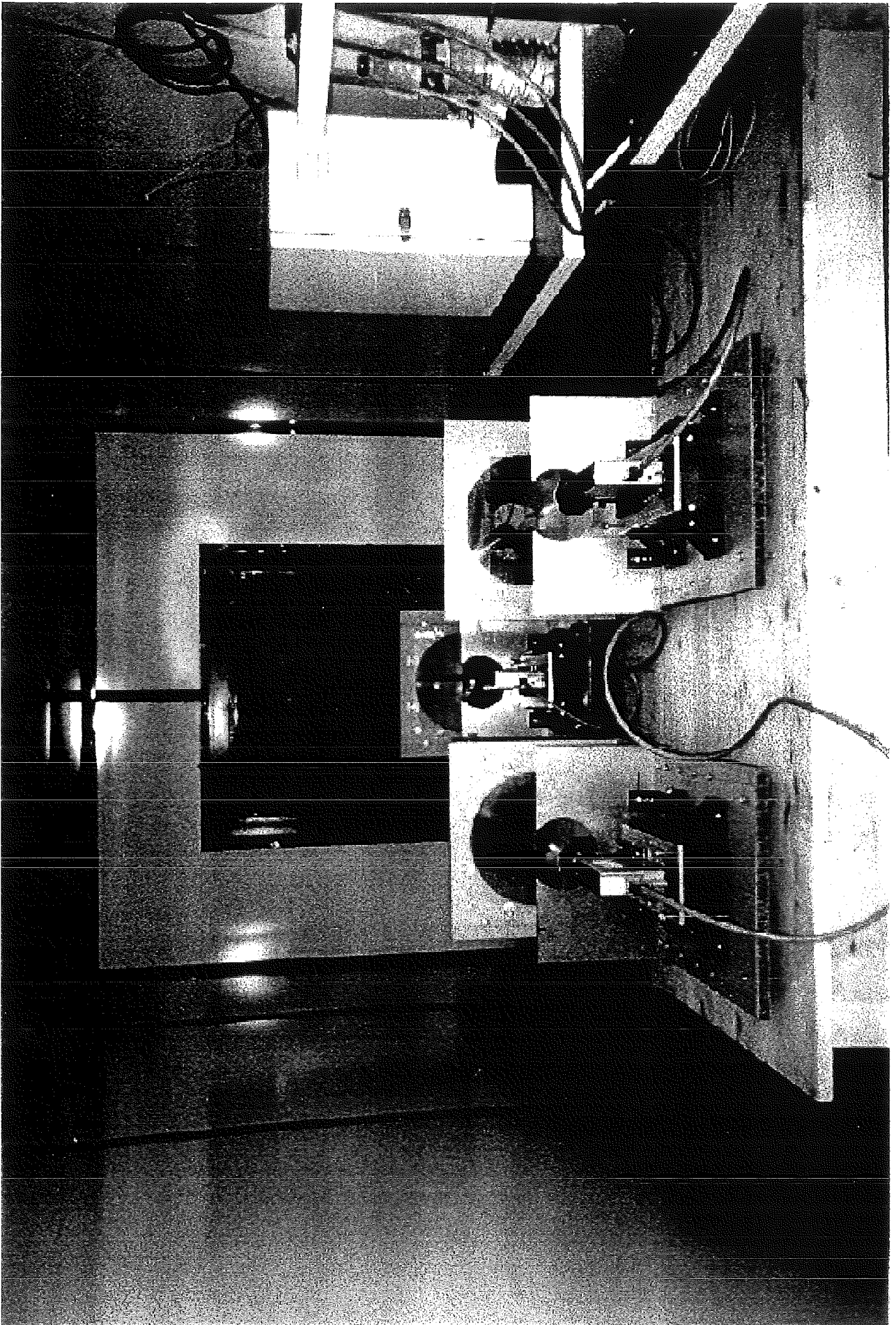
### Electrical Interface Voltage Levels

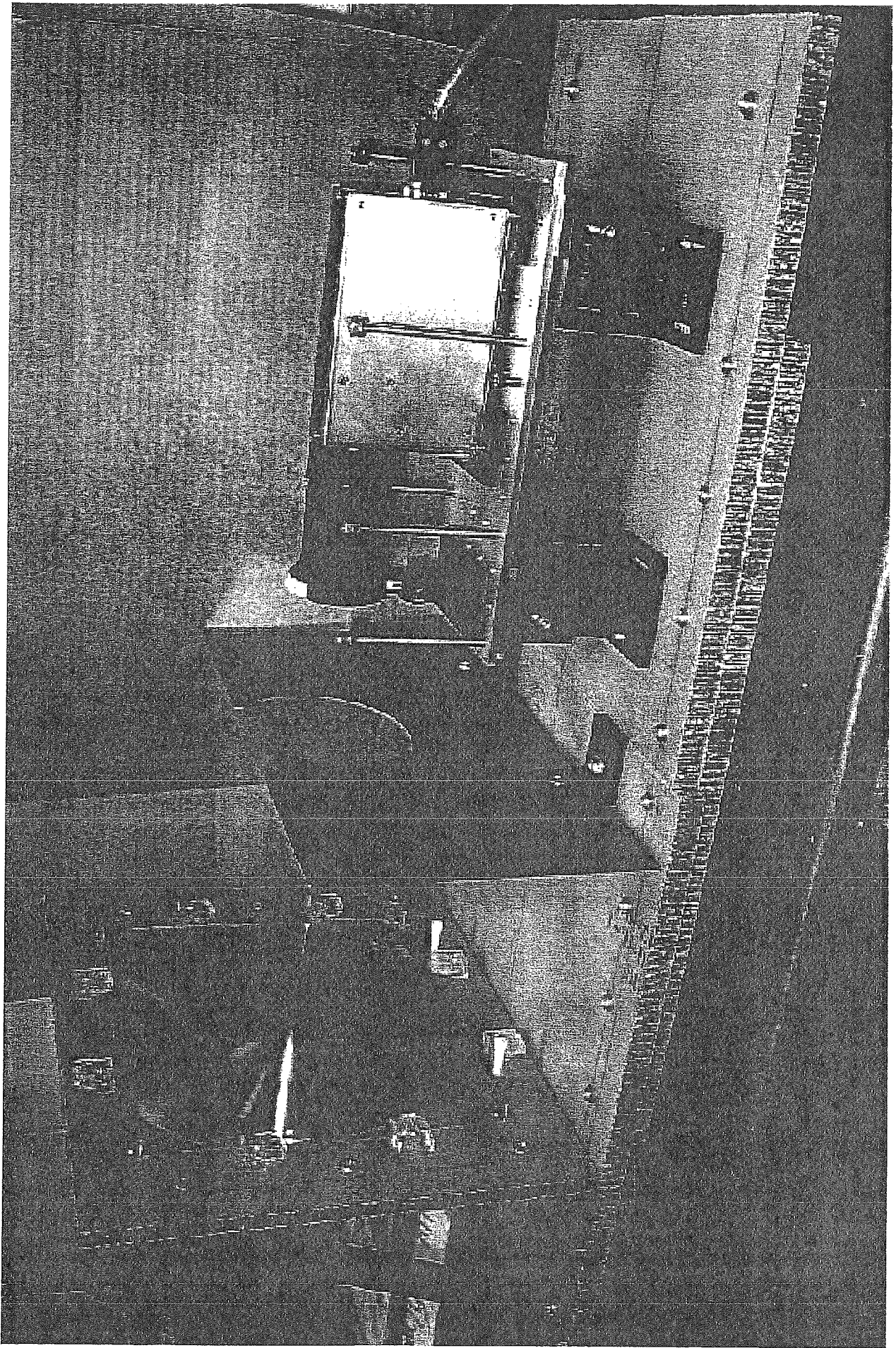
Input Levels	Low -3.0 to -30 Volts; High +3.0 to +30
Output Levels	Low < -5.0 Volts; High > +5.0 Volts at 3mA

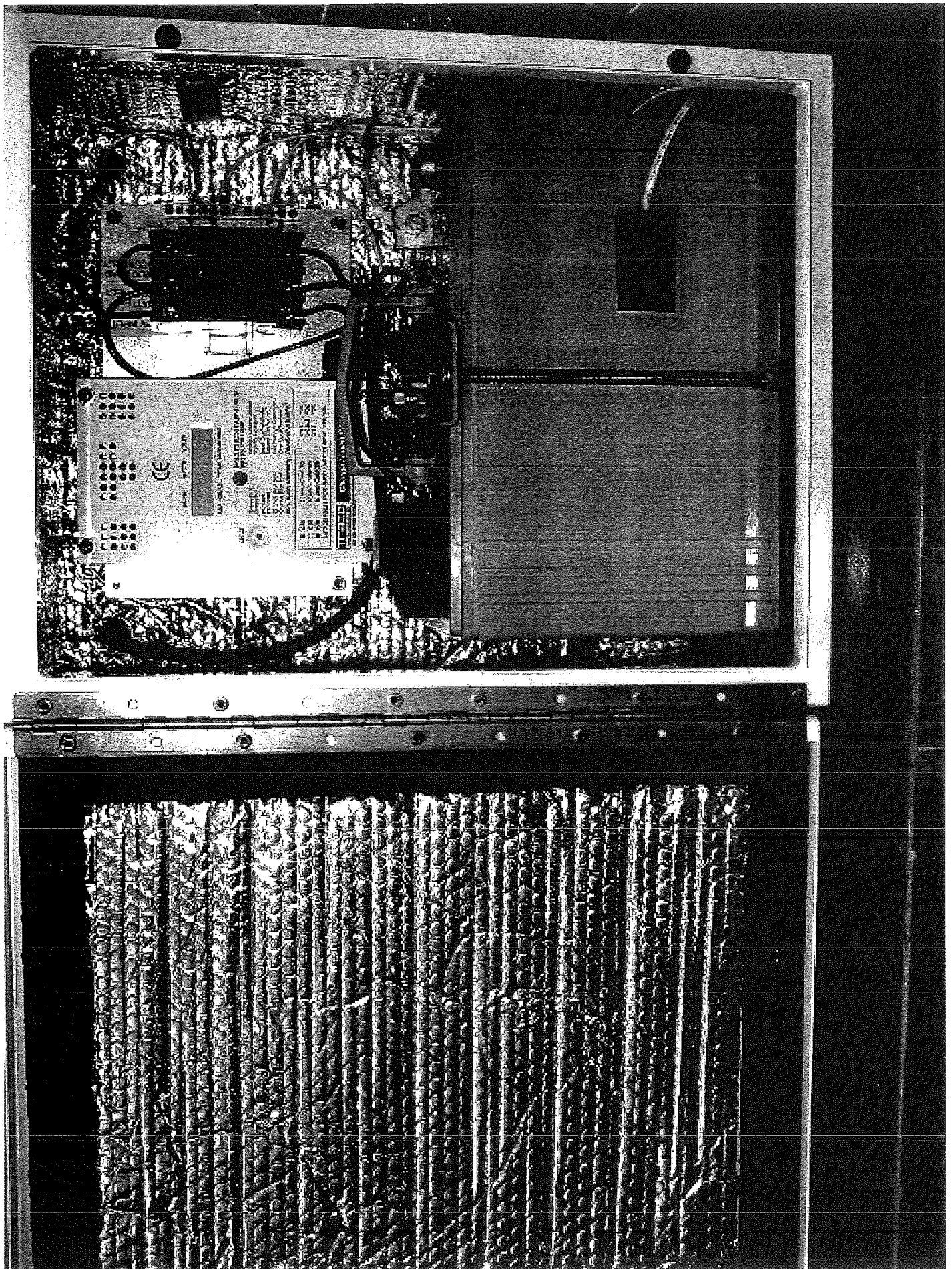


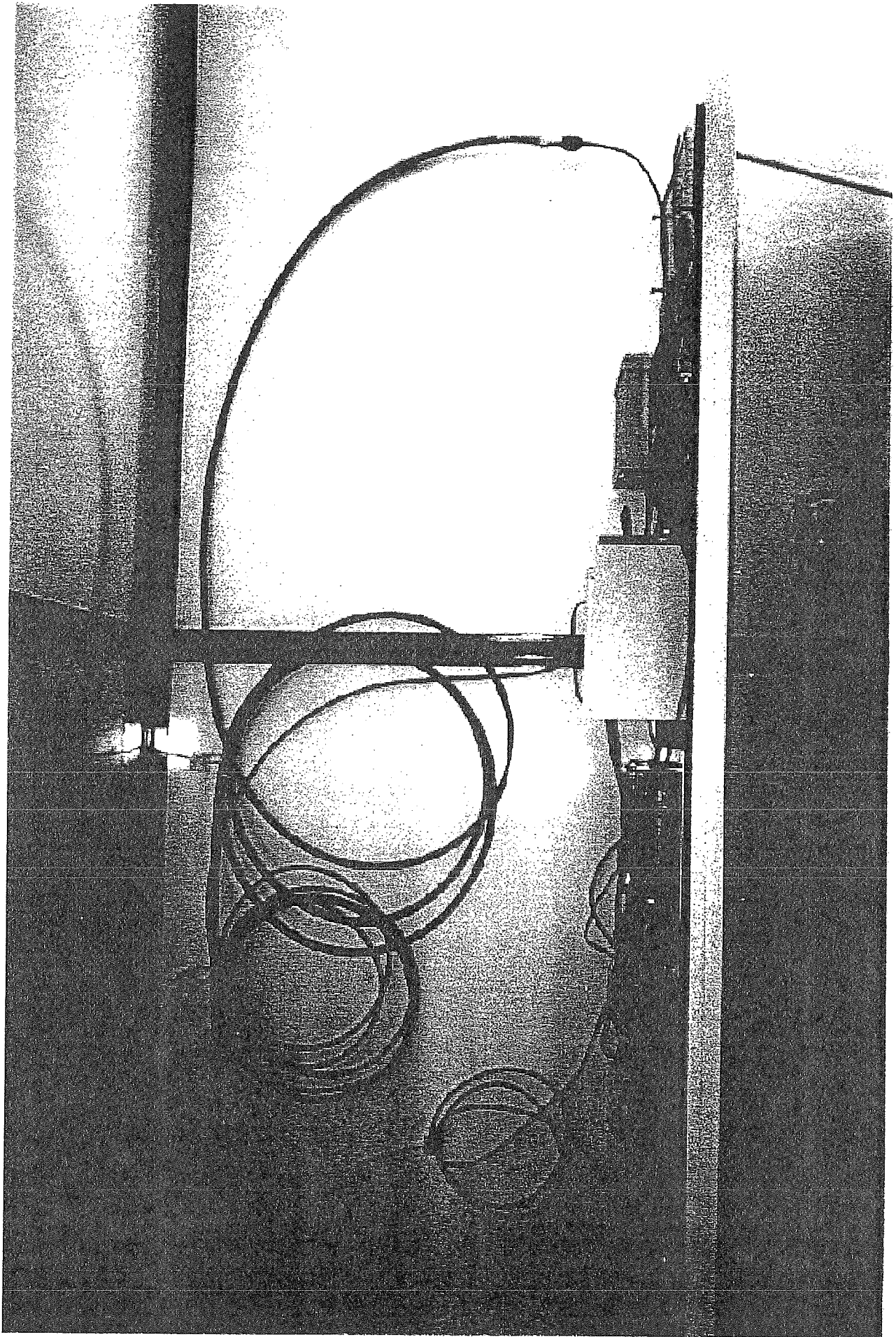
Zeus Wireless, Inc.  
8325 Guilford Road  
Columbia, MD 21046  
410-312-9851  
410-312-9852(Fax)  
www.zeuswireless.com











#### 4. Data analysis plans:

– APF analysis **input**:

1. molecular atmosphere: T, P for local adiabatic model
2. aerosol local extinction length: from *near in time* horizontal backscattered LIDAR measurements at Coihueco
3. scattered APF signals from as many of the 6 telescopes at the Coihueco FD as possible!

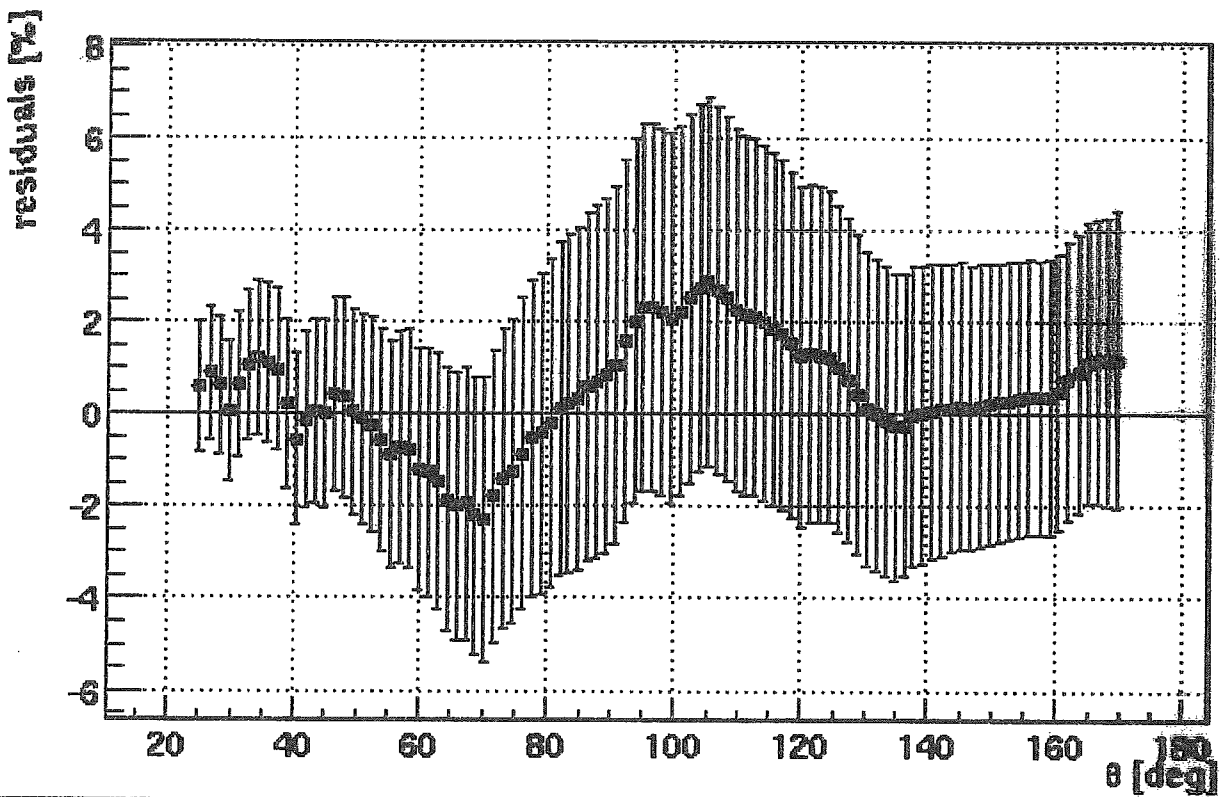
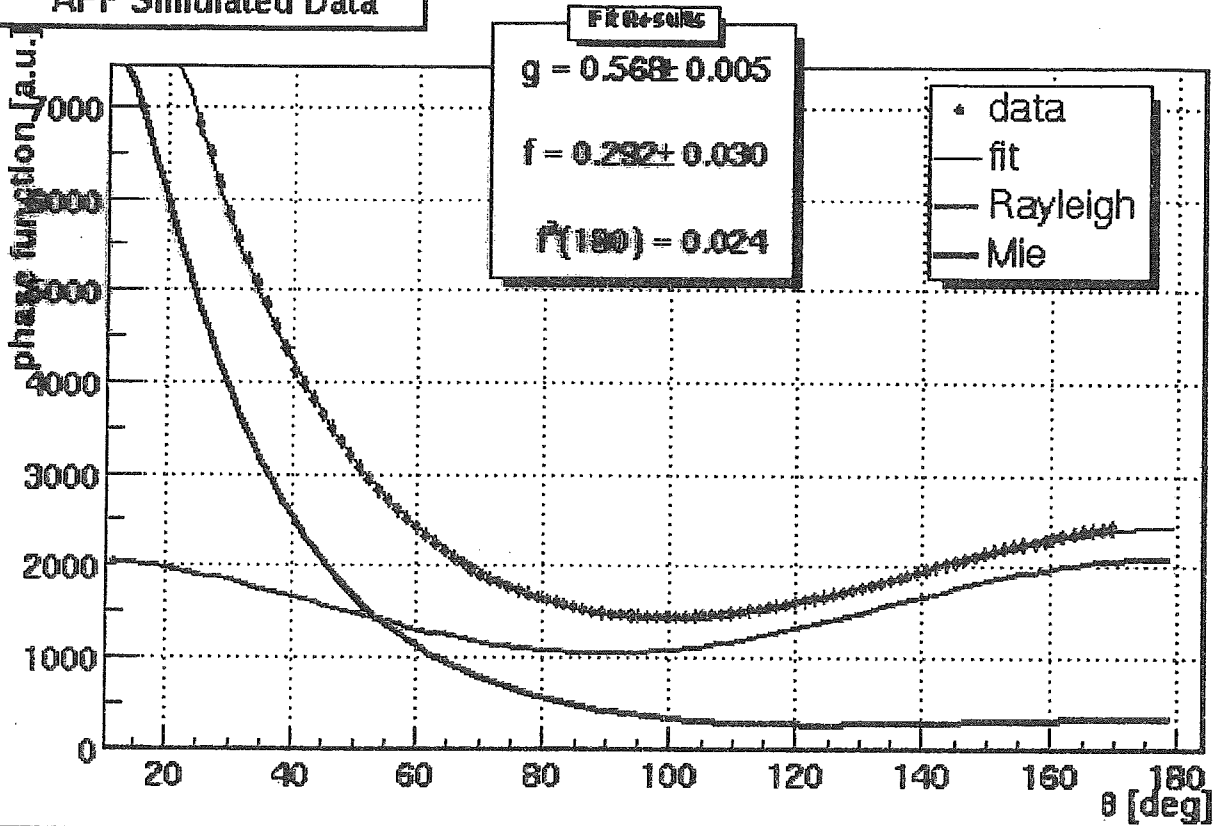
– APF analysis **output**:

1. **2 and 3** parameter *fits* for the aerosol phase function
2. two estimates of the aerosol phase function at  $180^\circ$
3. for 2-parameter fit, an estimate of the aerosol *albedo*

– Aerosol phase function results will be monitored at **334nm, 360nm and 390nm.**

– We should keep open the possibility of a 3-wavelength combined result (also).

# APF Simulated Data



APF Simulated Data

