



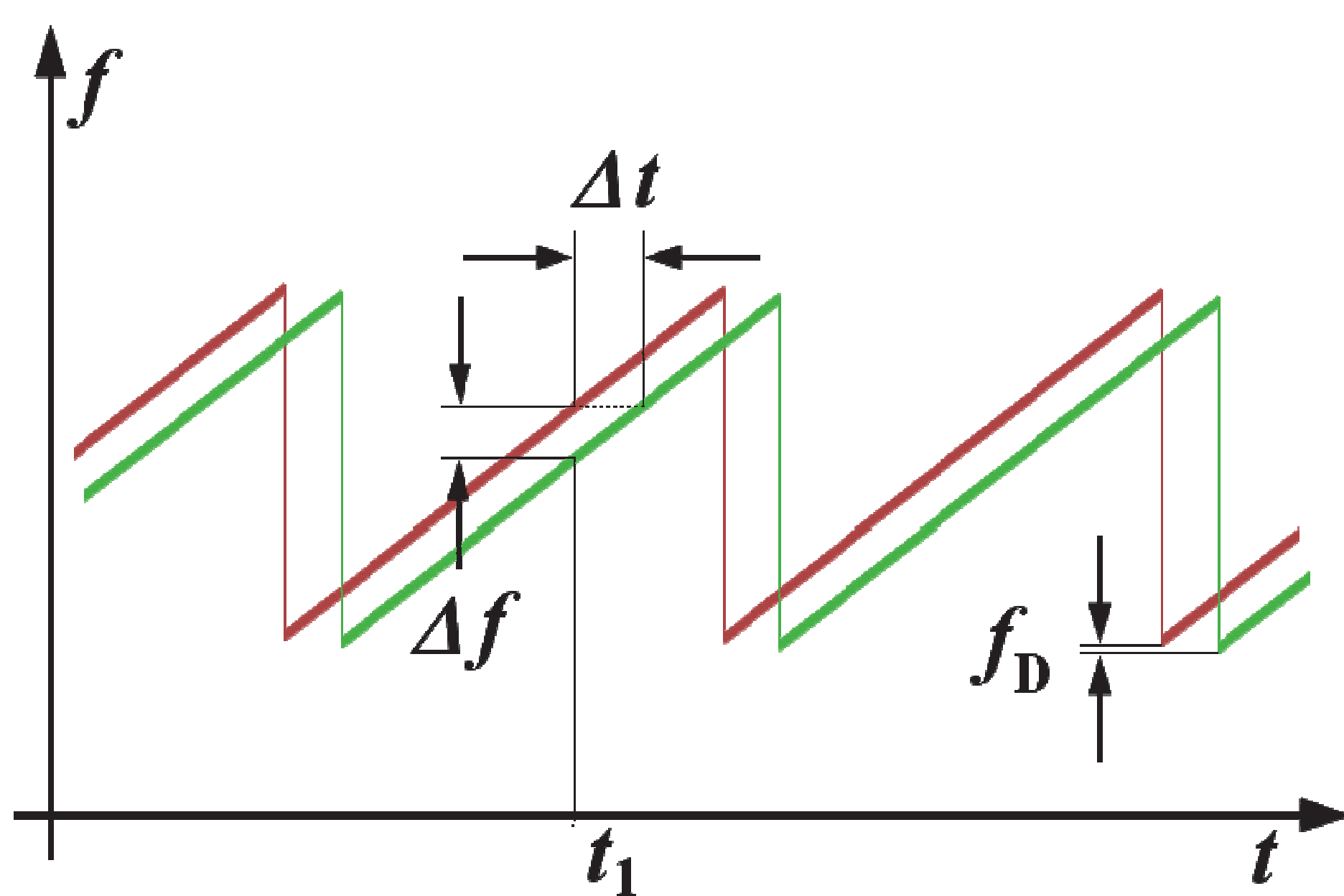
RPG-FMCW-94

RPG has developed the continuous wave cloud Doppler radar RPG-FMCW-94 operating at 94 GHz. Compared to widely used pulsed radars operating at lower frequencies, the RPG FMCW-94 has two major advantages: a much lower power consumption and high mobility due to the compact design.

Key Features

- Frequency: 94 GHz ($\lambda=3.19$ mm) \pm 500MHz
- IF range: 0.4 GHz to 0.7 GHz
- Continuous power: 500 mW
- Antenna type: Bi-static Cassegrain with 500 mm aperture
- Antenna gain: 52.3 dB
- Beam width: 0.45° FWHM
- Dynamic range: -50 dBz to +20 dBz
- Ranging: 50 m to 12 km
- Sampling rate: 4 s
- Doppler resolution: \pm 15 cm/s
- Doppler range: \pm 10 m/s
- Chirp variations: 7
- Passive channels (optional): 89/170 GHz for integral LWP detection
- Scanning capability: elevation and azimuth

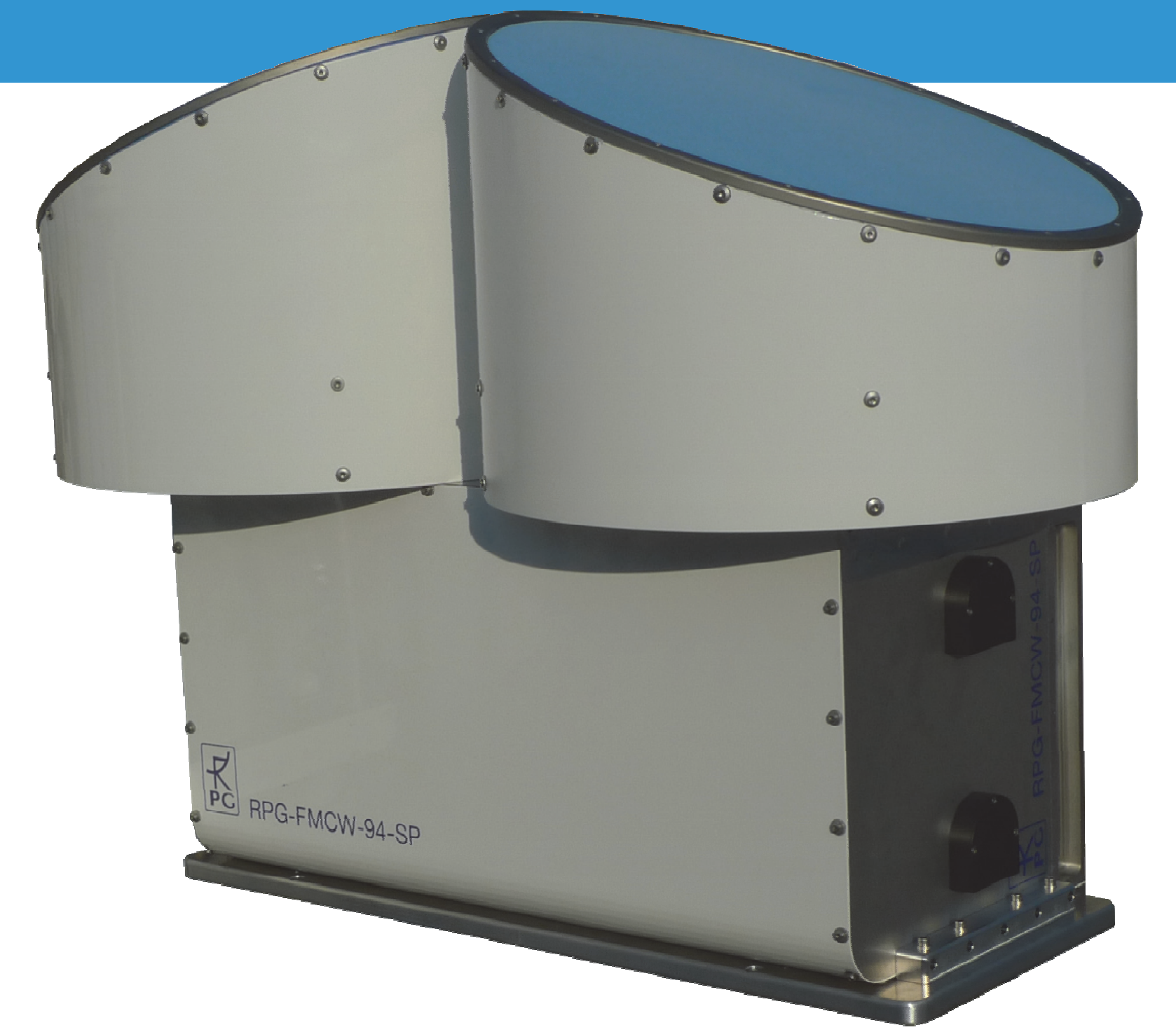
First Light



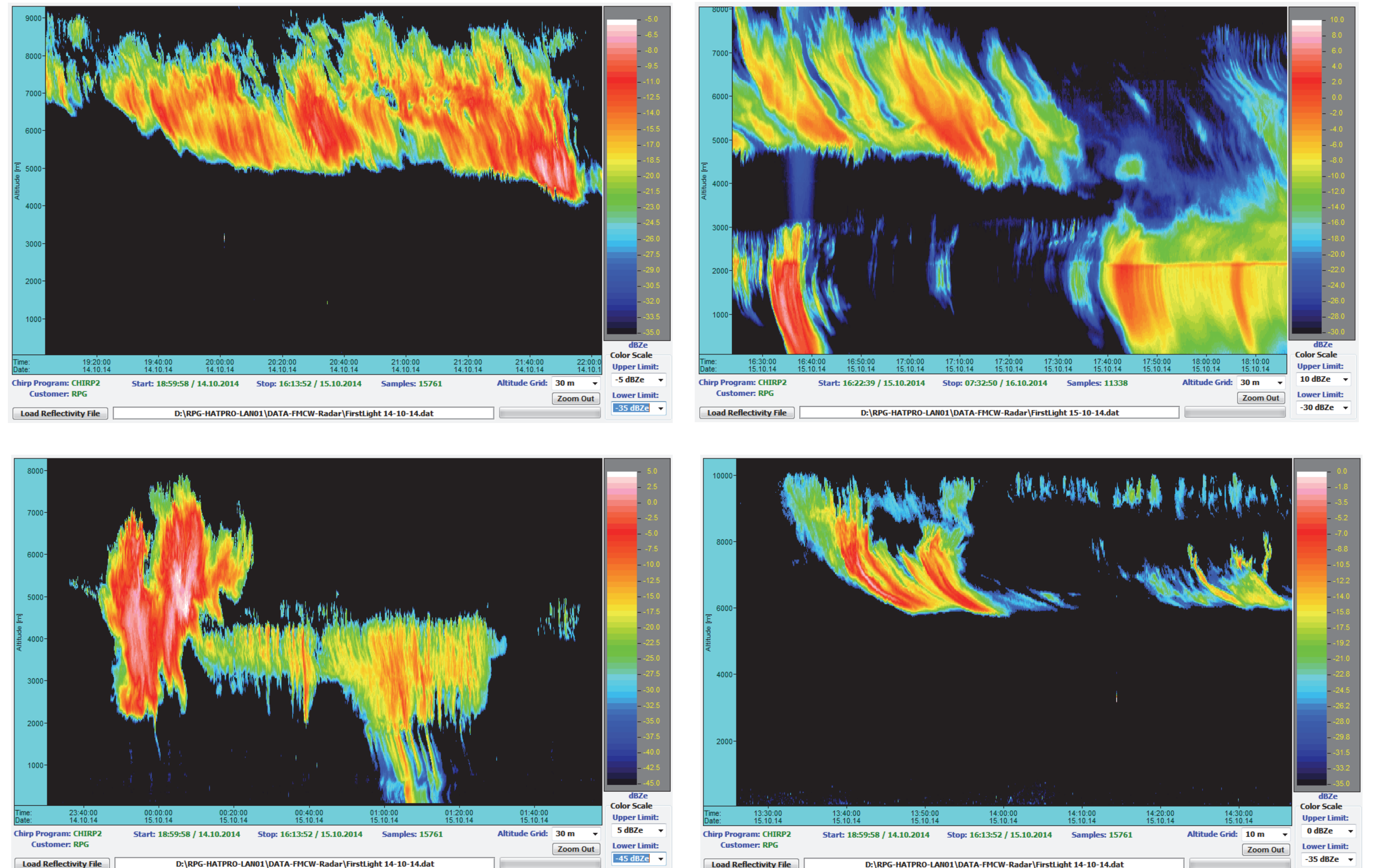
- Principle: time lag Δt between continuously emitted and received frequency chirps gives a spectrum of beat frequency Δf
- Beat frequency spectrum contains ranging information with a resolution of $\Delta r = c/2\Delta f$
- Doppler shift f_D provides velocity profiles

Applications

- High resolution vertical profiles of dBz
- LWC (Liquid Water Content) profiles
- 2D cloud profiles through elevation scanning
- Velocity profiles from Doppler spectra
- Dual Polarization (DP, optional): discrimination between cloud droplets, rain, and snow



First Light



Design

- The bi-static design with shielded and accurately levelled optics (antenna decoupling <-100 dB)
- The generated HF signal is split up into an emitting and a receiving branch
- The receiver branch is attenuated and mixed with the signal from the receiver antenna
- The mixer down-converts the signal to the IF range
- IF signal is then filtered, amplified and digitized

