A new unambiguous, multi-baseline interferometric technique was recently employed for meteor observations at Jicamarca Radio Observatory (JRO). This technique allows for high-altitude radar meteor events (HARMs) to be detected and analyzed with high resolution. The 50 MHz JRO array is equipped with two interferometric baselines, Q-Q and M-M, which are arranged to provide a constant geometric baseline that remains fixed as the target moves. The interferometric technique yields ambiguity results that are consistent with the true position of the meteor trail, resolving both angular and range information.

**Experiment Setup**

East and West quarters (in yellow) were used for transmitting. Channel A, B, and C are quarter receivers, D, E, and F are module receivers. These 6 channels are of the same polarization as the transmitting quarters. Channel G is of perpendicular polarization to monitor cross-talk.

This radar configuration offers 3 independent 2-D interferometric baselines: Q-Q (CA-BC), M-M (EF-DE), and Q-M (BF-EA). The combination of these 3 interferometric results yields unambiguous angular positions of detected targets.

**Observations and Analysis**

This HARM event was detected at a beginning height of 153 ± 0.15 km and ended with a terminal flare spreading down to 98 ± 0.15 km. It has a radial speed of ~60.33 km/s towards the radar, and a radial deceleration of ~3.04 km/s².

The terminal flare took place within the traditional meteor zone, with features resembling those commonly observed at JRO. The fact that the wider M-M beam observed more lobe structures than the narrower Q-Q configuration, and that the associated terminal flare ranging from 98 to 113 km and interacting with the EEL, supports our contention that this HARM event was seen in our overhead concentric main beam.

**Conclusions**

We herein confirm our observations of high-altitude radar meteors (HARMs) based on the following evidences:

- For our overhead concentric beams, the wider Module-Module receiving configuration observed more lobe/null structures than its narrower Quarter-Quarter receiving counterpart;
- Trail echoes of the observed HARM events were located at the kBB regions;
- The interferometric results from three independent measurements (Quarter-Quarter, Quarter-Module, and Module-Module receiving configurations) indicate an unambiguous angular position for the observed meteor head echo.
- The SNR matching technique for head echoes indicates an overhead flyby in the main beam;
- It is unrealistic to detect a HARM event with such excellent features in noise-dominating sidelobes according to the radiation pattern analysis of the JRO array.

**References**

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