# AI-Assisted Real-Time Monitoring and Reporting of Solar Radio Activity with OVRO-LWA

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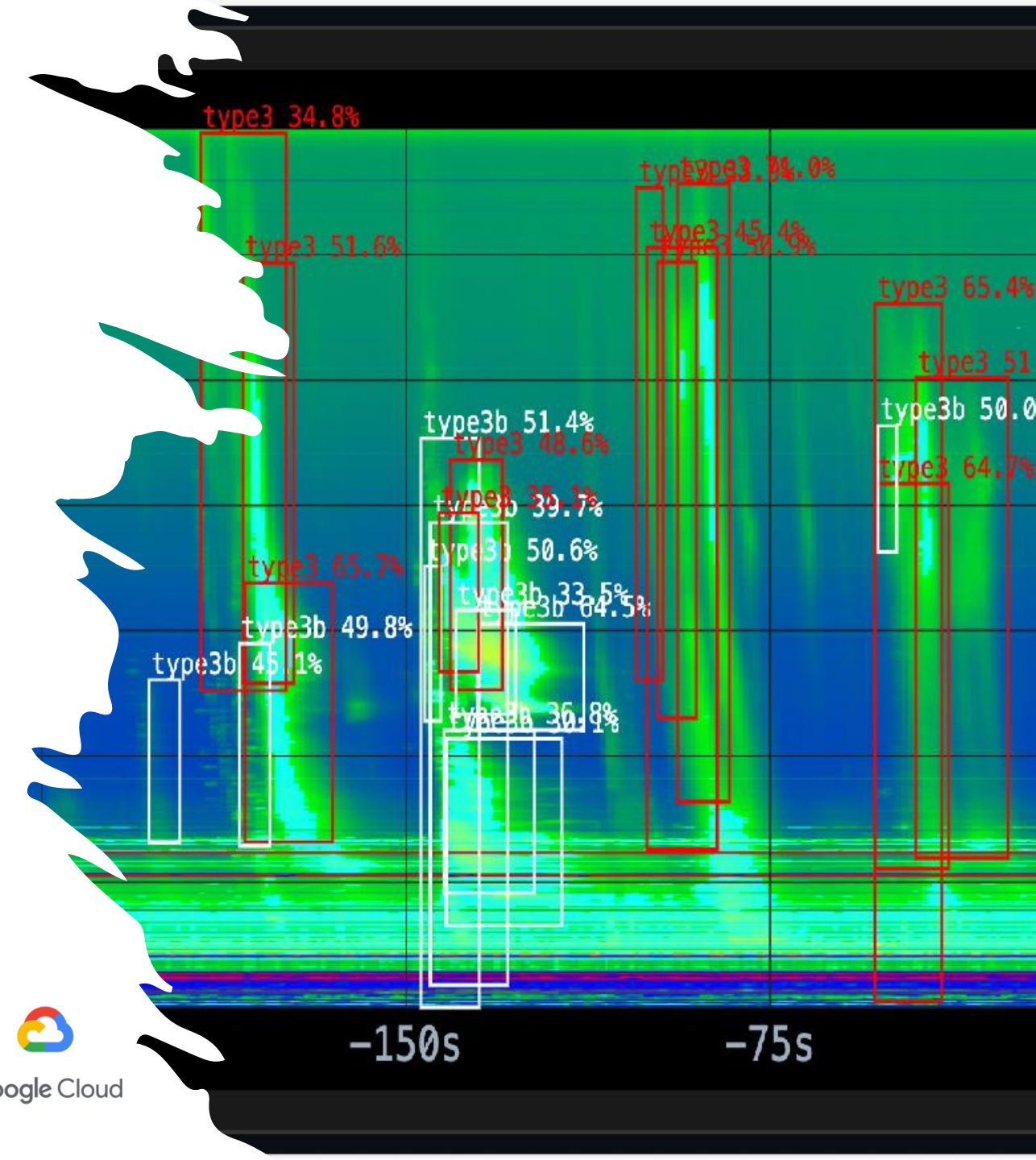
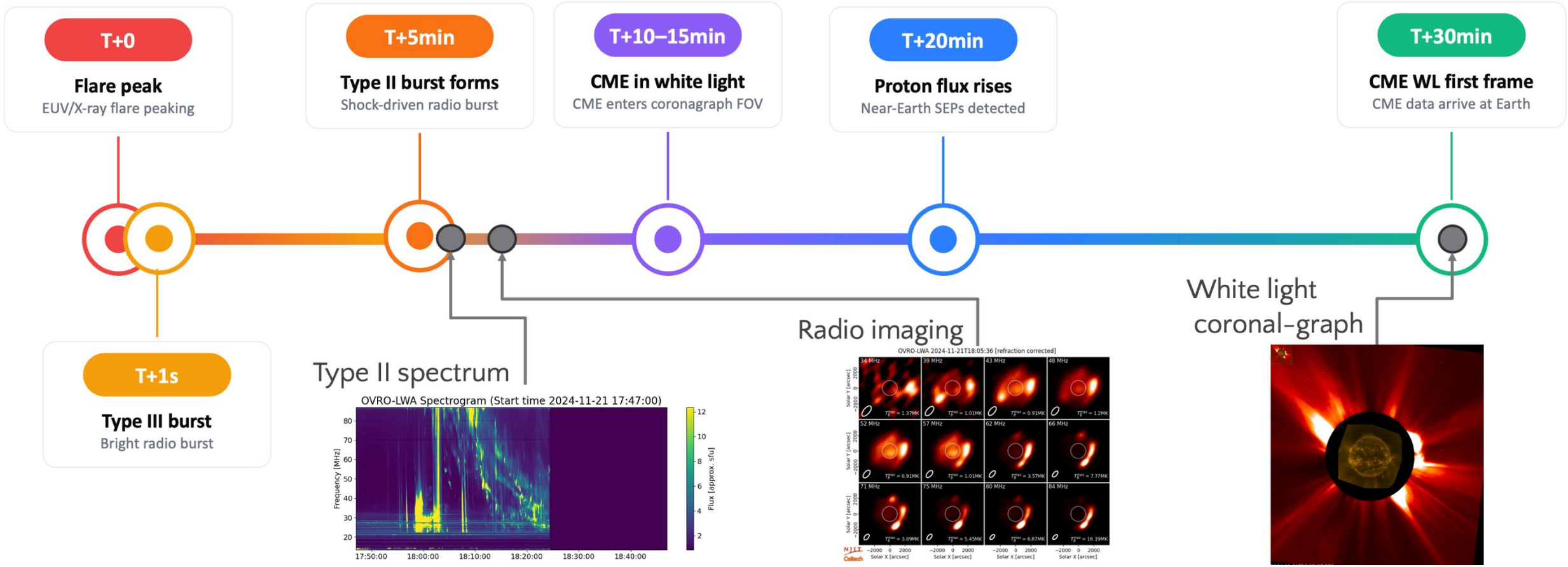
and OVRO-LWA team



# Motivations for realtime and AI assisted reporting

- Solar radio burst is a good indicator of the energetic particle accelerations solar activities.
- Timely reporting of radio burst type, brightness, morphology can help evaluate SEP of the event.



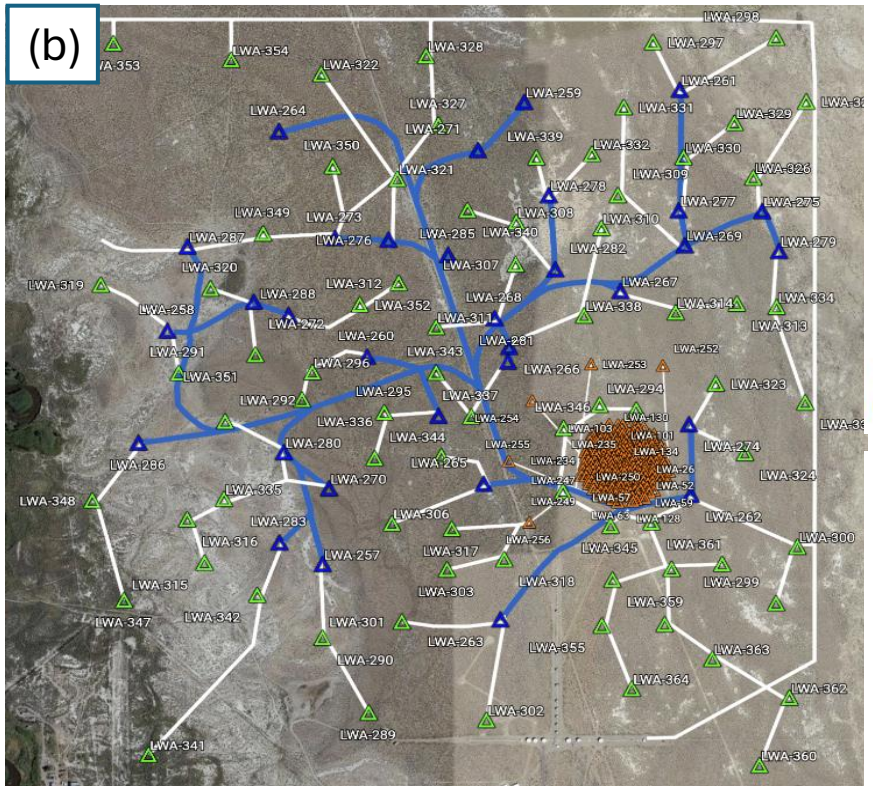
# OVRO-LWA

352 Antennas (LWA dipole) - Full array cross correlation
Layout: Dense core + Out-riggers

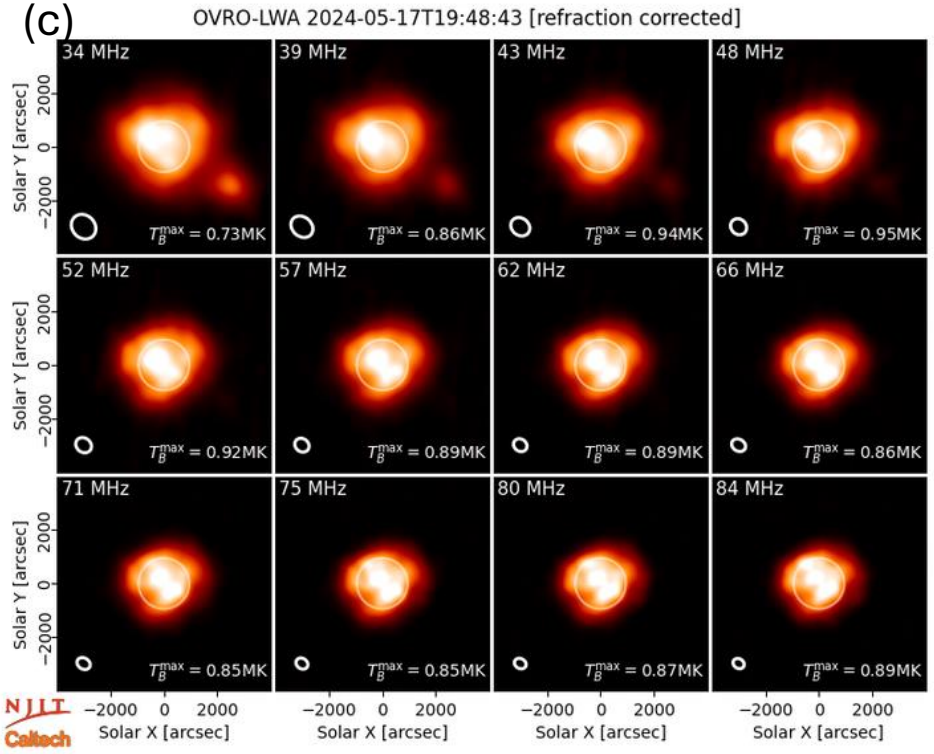
- Fast mode imaging: Full array 10s cadence
- Slow mode imaging: 48 ant 10s cadence
- Dynamic spectrum: 256 ant beamforming 1ms, 24kHz resolution

(a)

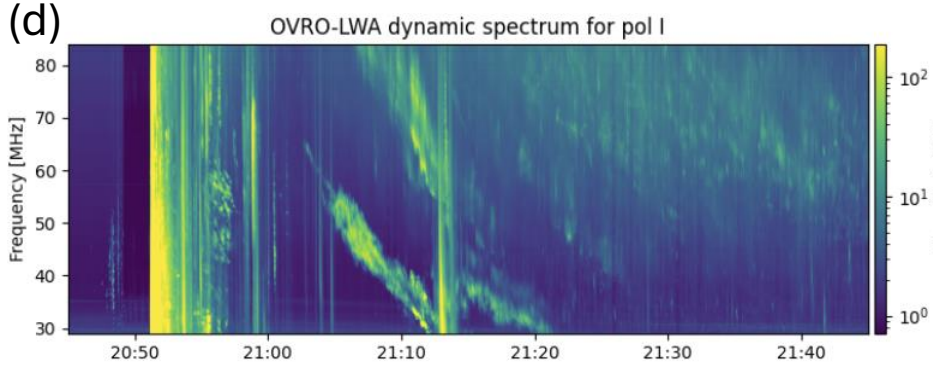
(b)



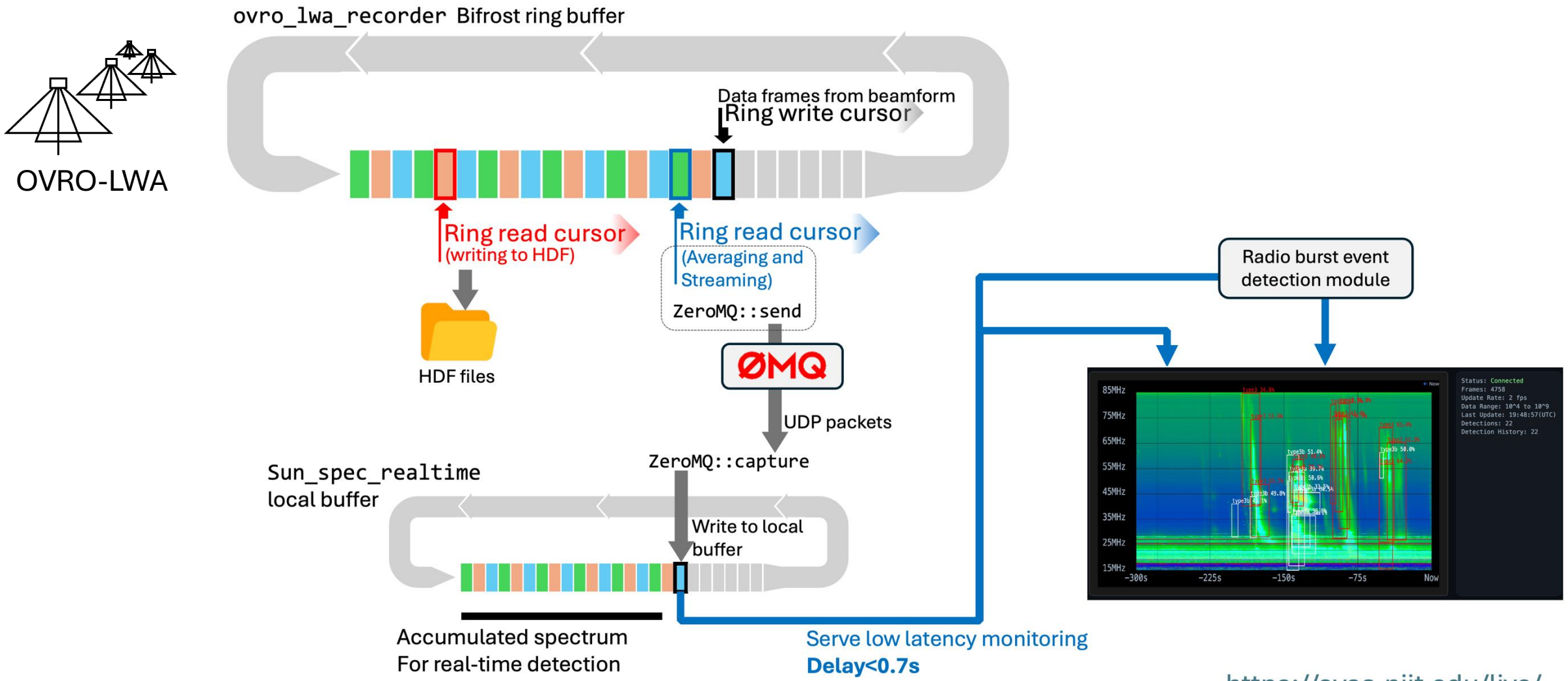

(c)




(d)



# Low latency data acquisition of the dynamic spectrum

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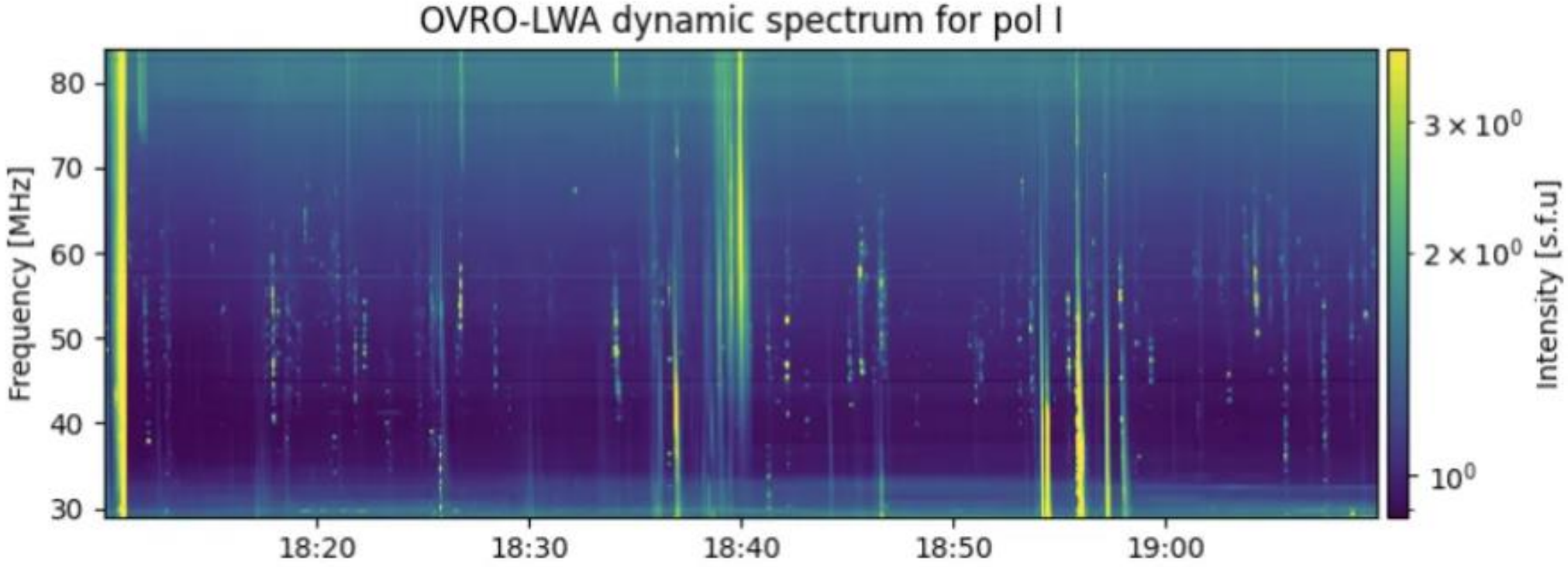
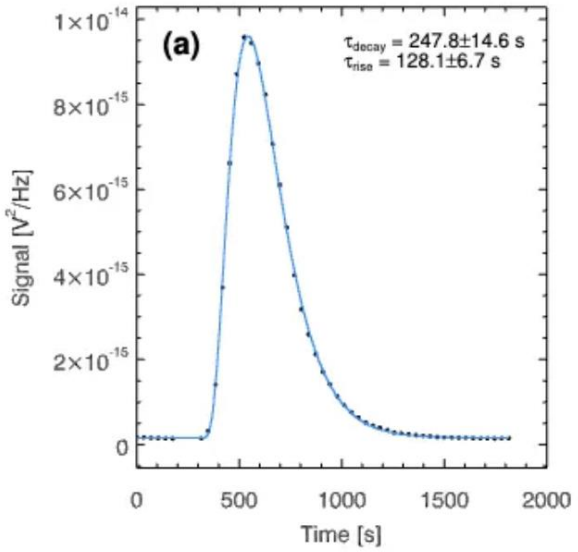
# Event detection

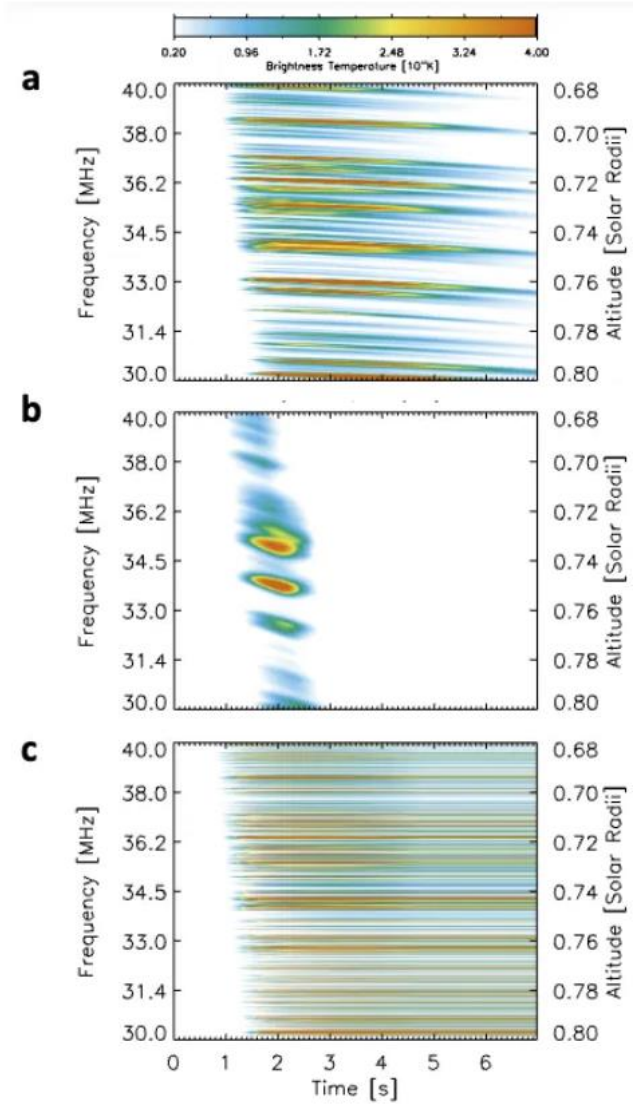
- Radio burst detection with YOLO
- Requires large amount of precise labels of bounding box



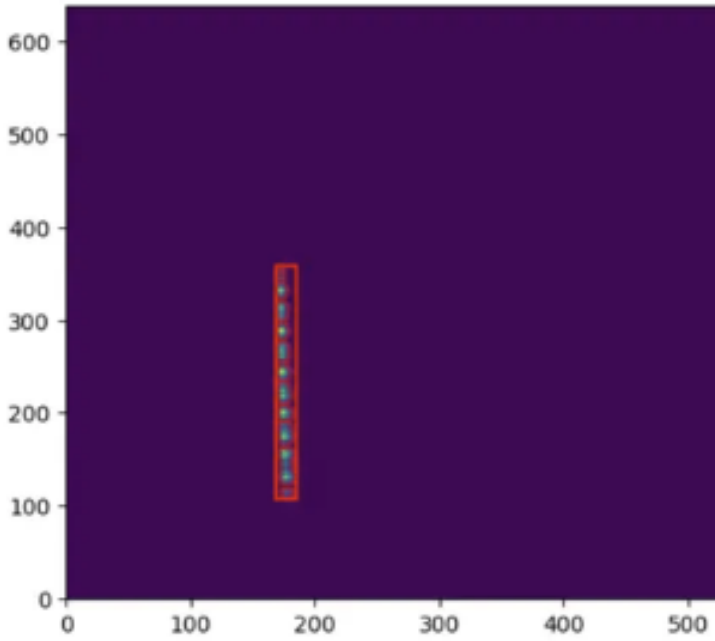
# Physics informed training set generation

- Time profile
- Frequency drift rate
- Fine structures
- Starting ending freq



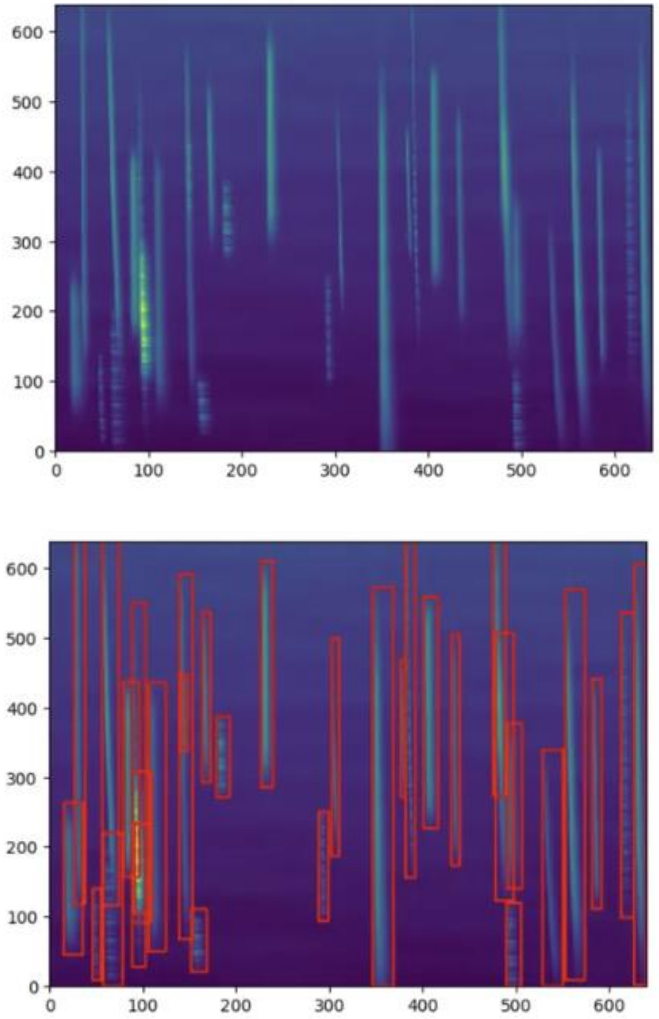



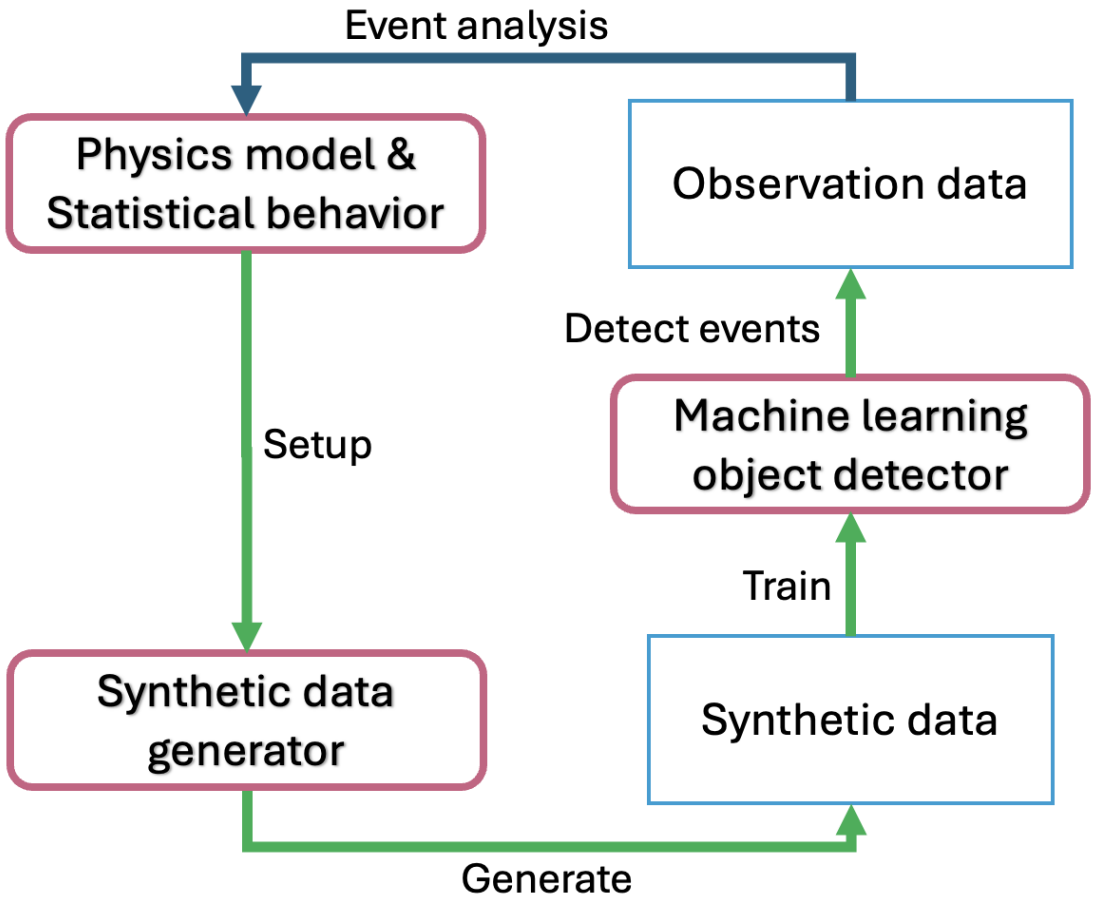

Generated burst will have the ground truth bounding box and label



# Training set and detection

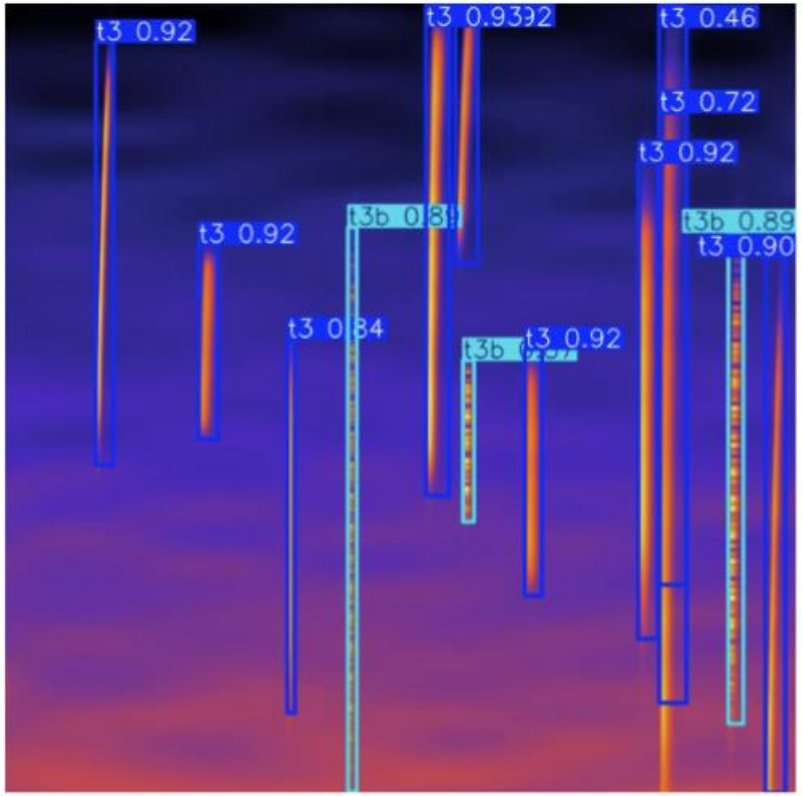
Infinite amount of sample for training



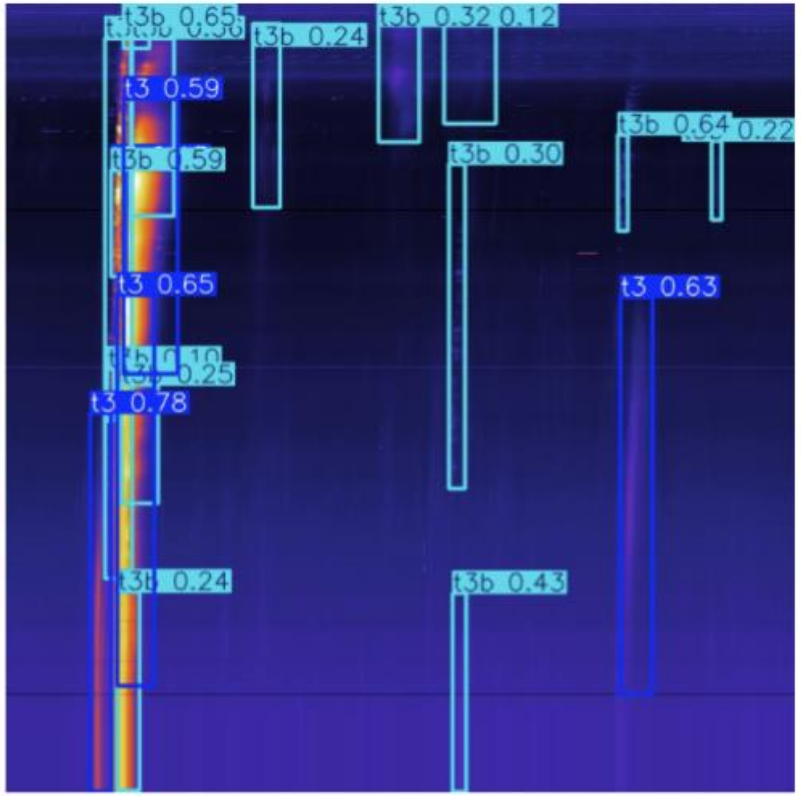



# Result

Validation on generated data




on real observed data

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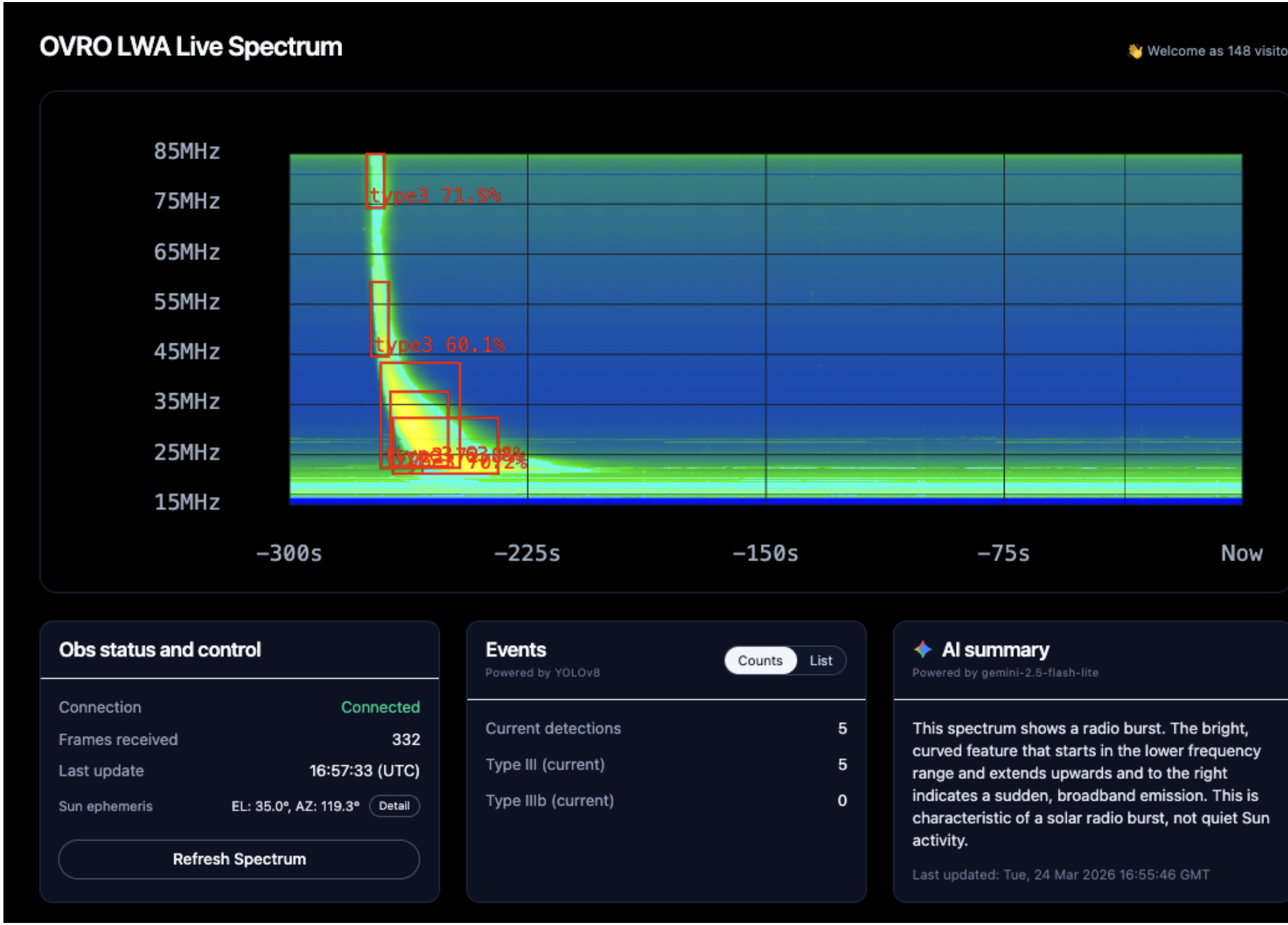
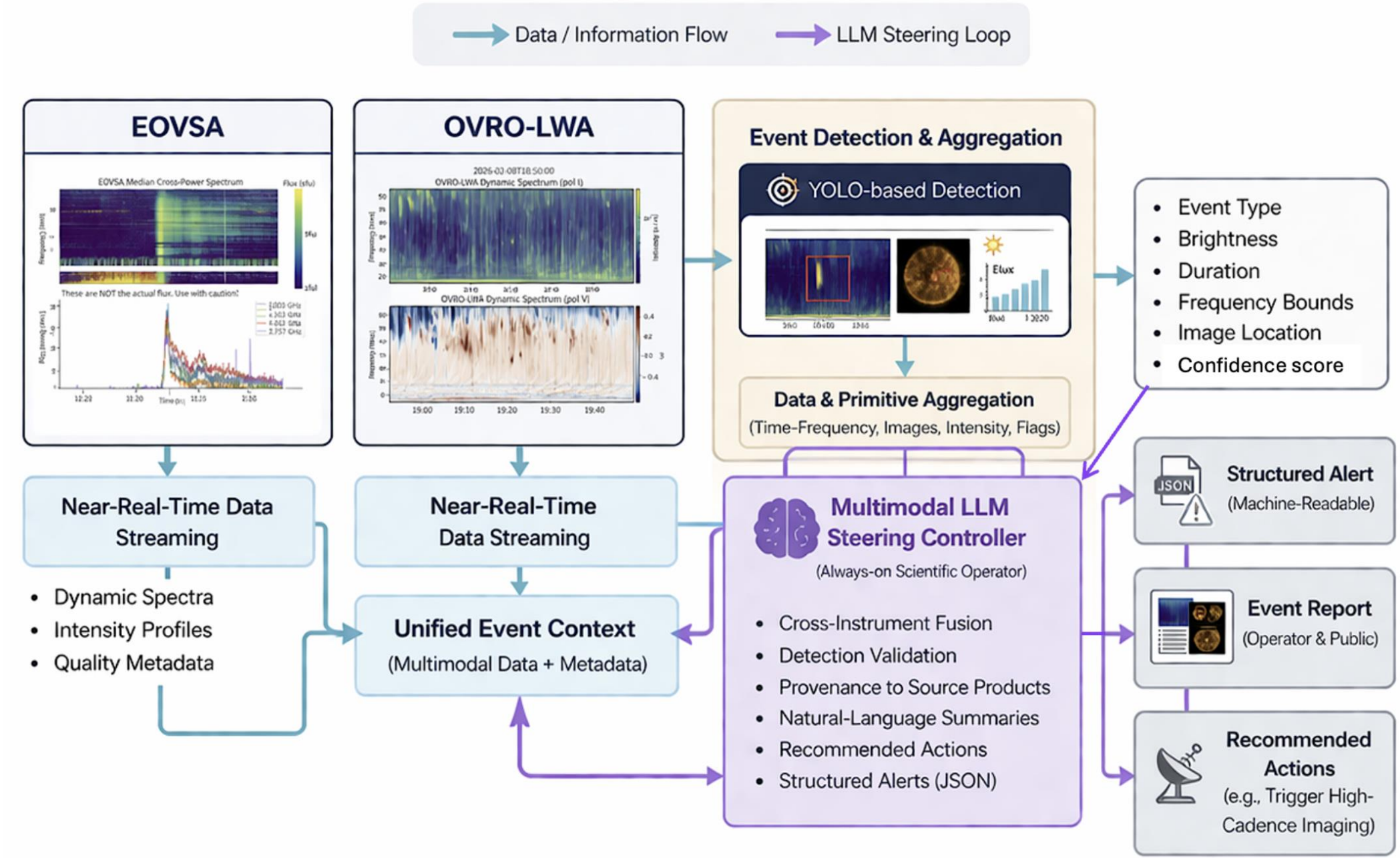
# YOLO+LLM

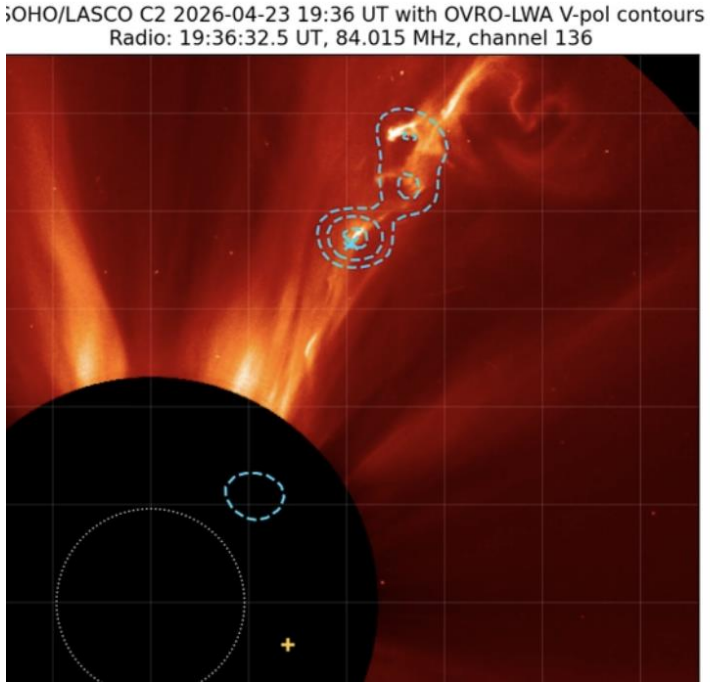
- LLM assisted real-time observing
- Send data and header and event detections to AI for summary and alerting

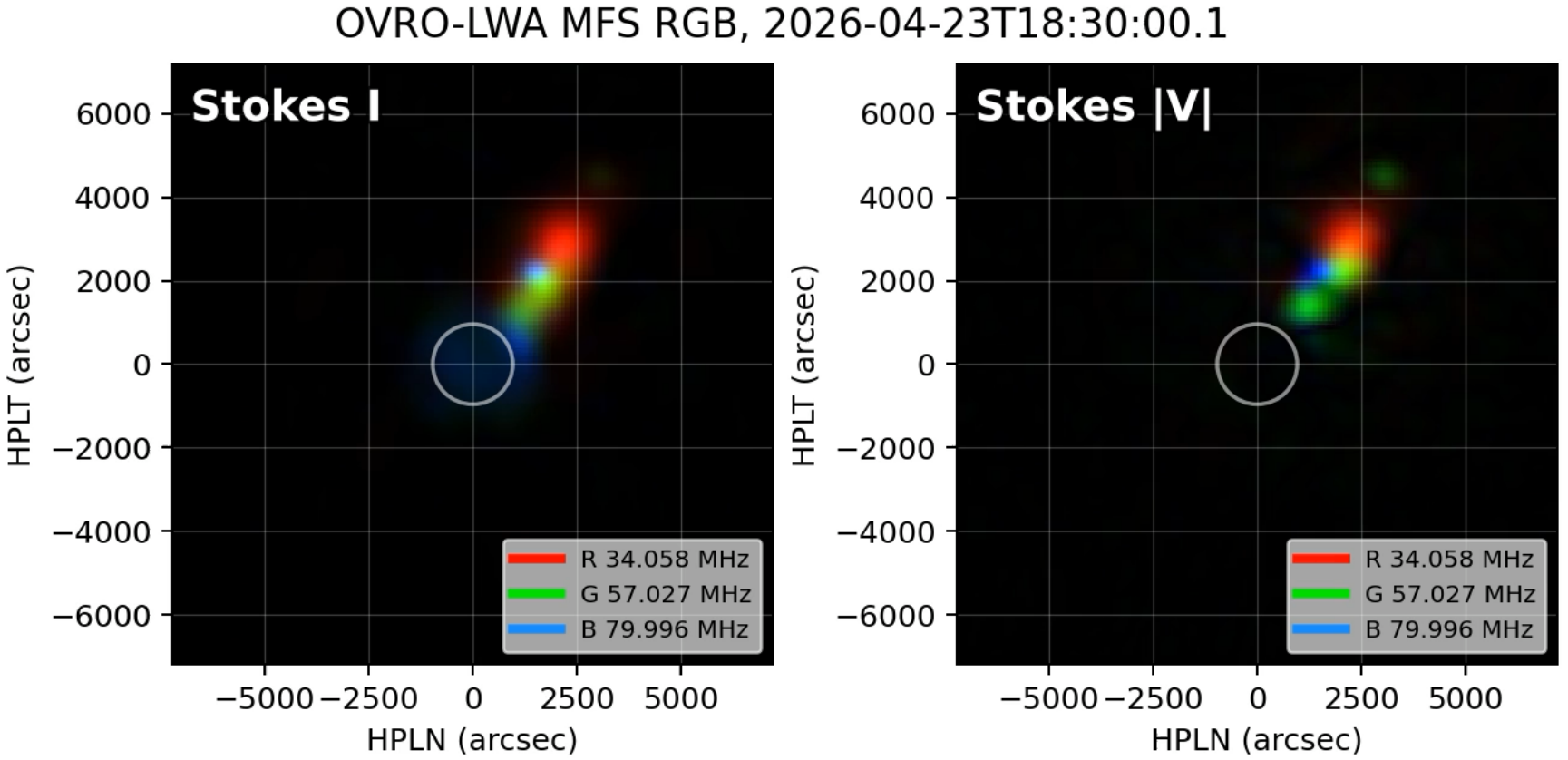


# Workflow of  low-latency AI-assisted framework

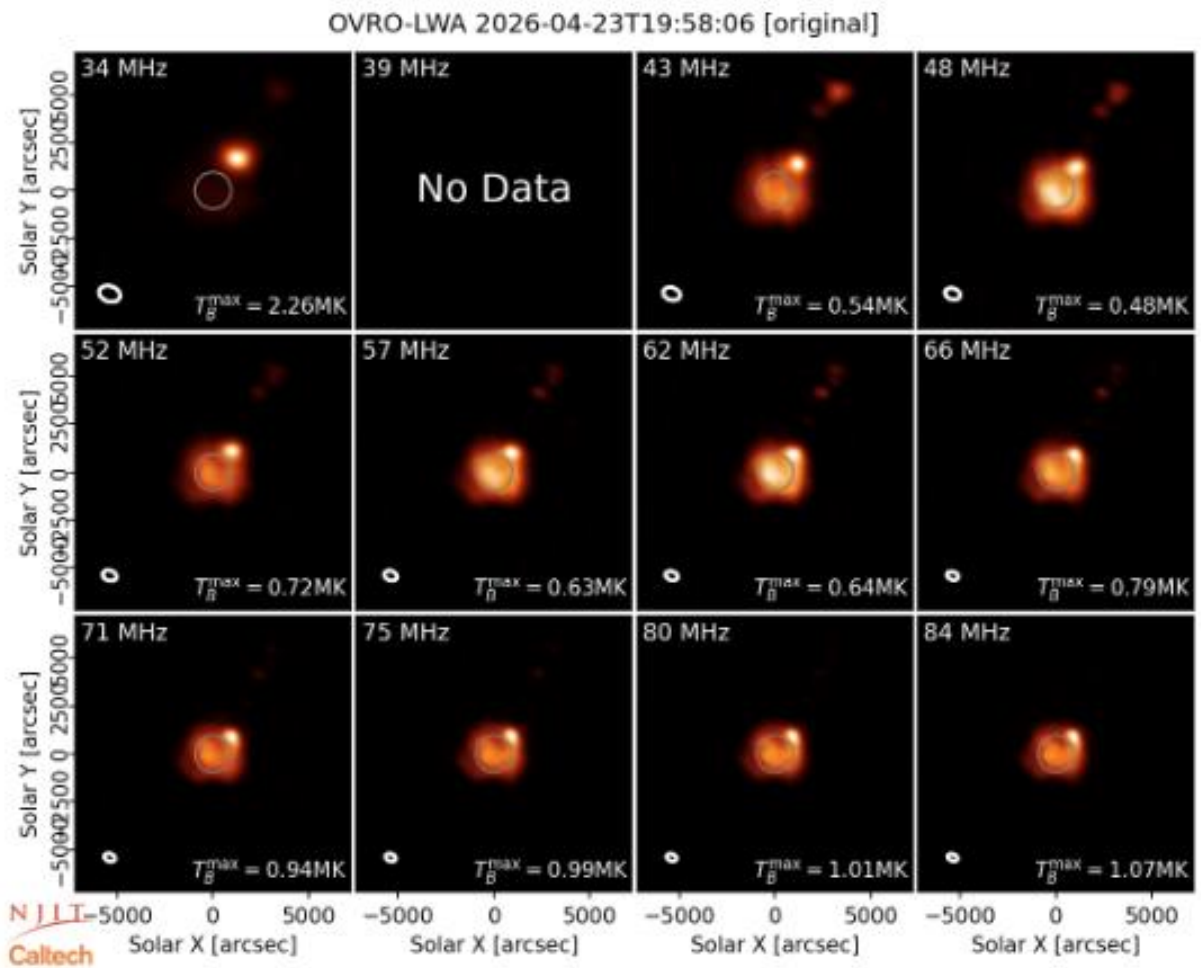


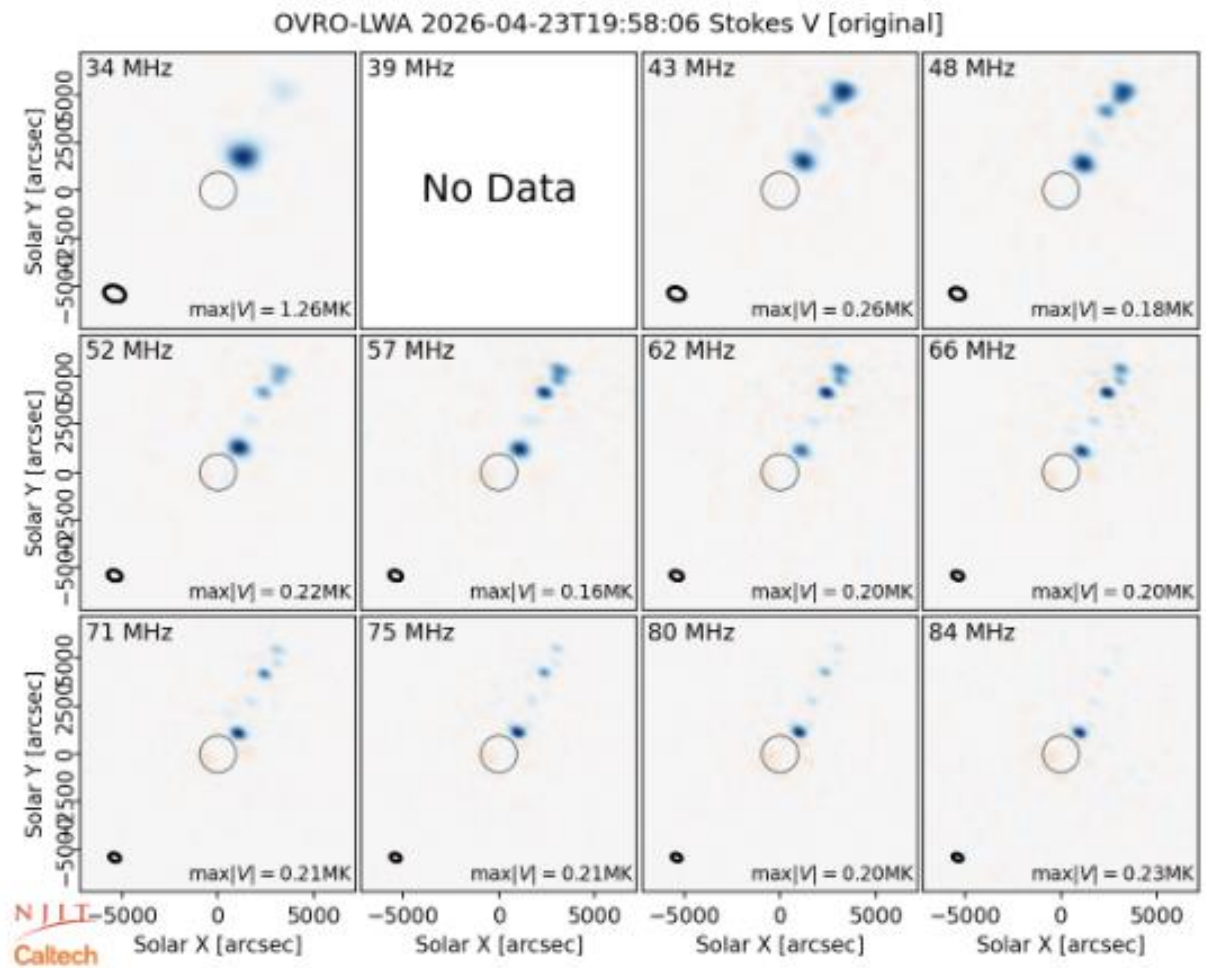
# Next step, imaging and polarization (work in progress)



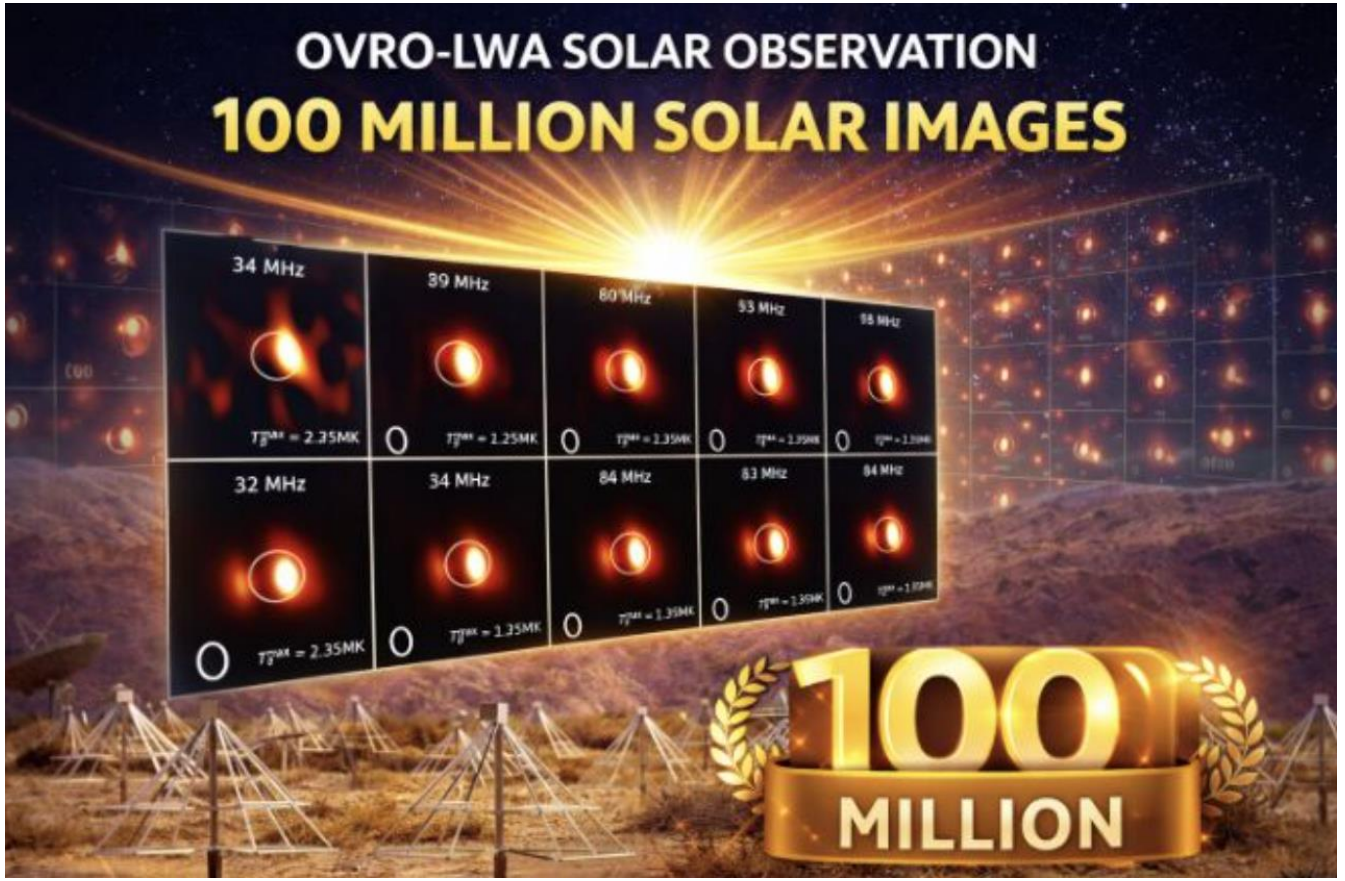
# Polarization imaging is a natural coronal graph



# Also next step

- Composing ML dataset of dynamic spectrum and imaging
- 100M images achieved on Feb-2026 and growing



# Summary

- Buffer-streaming enables realtime datastream of solar ..( **<0.5s** delay ) of dynamic spectrum
- Report radio burst **<5s** of event happening, serving space weather nowcasting and forecasting.
- Physics based training set generation can save huge amount of labeling time and giving the ground truth labeling
- LLM assisted observing interpretation and alerting