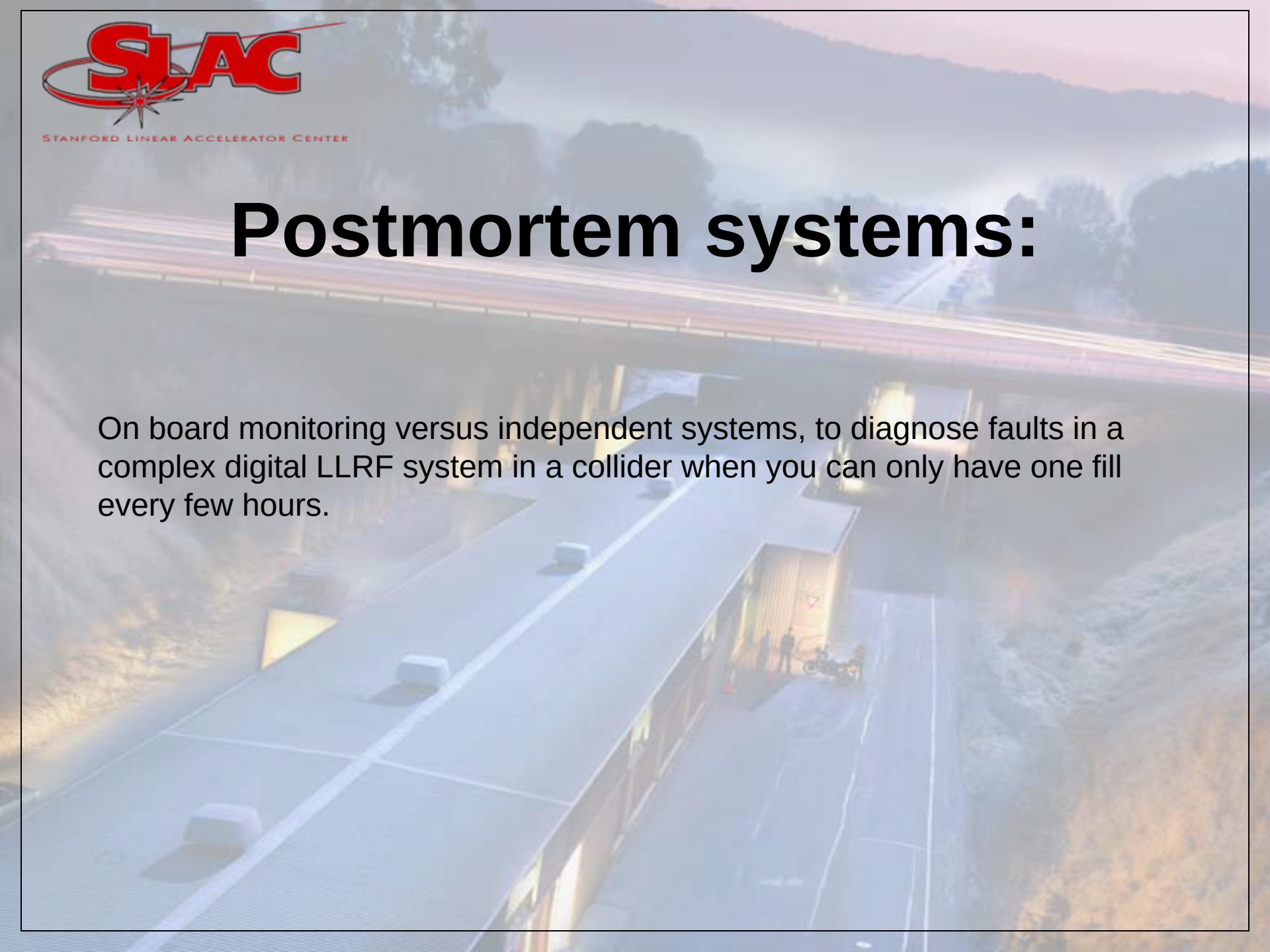


Postmortem systems:

On board monitoring versus independent systems, to diagnose faults in a complex digital LLRF system in a collider when you can only have one fill every few hours.

A Few Ideas from PEP-II

On- Board Monitoring/Diagnostics

Advantages:

- Can measure “inside” the loop
- Real time recordings during running
- “Fault file” time recordings of items during fault
  - Cavity Field/Forward Power/Reflected Power etc.
- Can be used for configuring closed loop systems
- Can easily record multiple items in a time synchronous fashion
- Cost depends on complexity but likely cheaper than expensive external equipment

A Few Ideas from PEP-II

On- Board Monitoring/Diagnostics

Dis-Advantages:

- Increased Complexity
- Increased design time
- Somewhat inflexible (but can always buy external diagnostics)
- Calibration requirements?
- Repair and maintenance
- Who does the analysis?

A Few Ideas from PEP-II

External Diagnostics

Advantages

- Flexible
- Reduce Design Time
- Warranted Performance
- External Support (i.e. Tech support)
- Software Reduction (for a price)

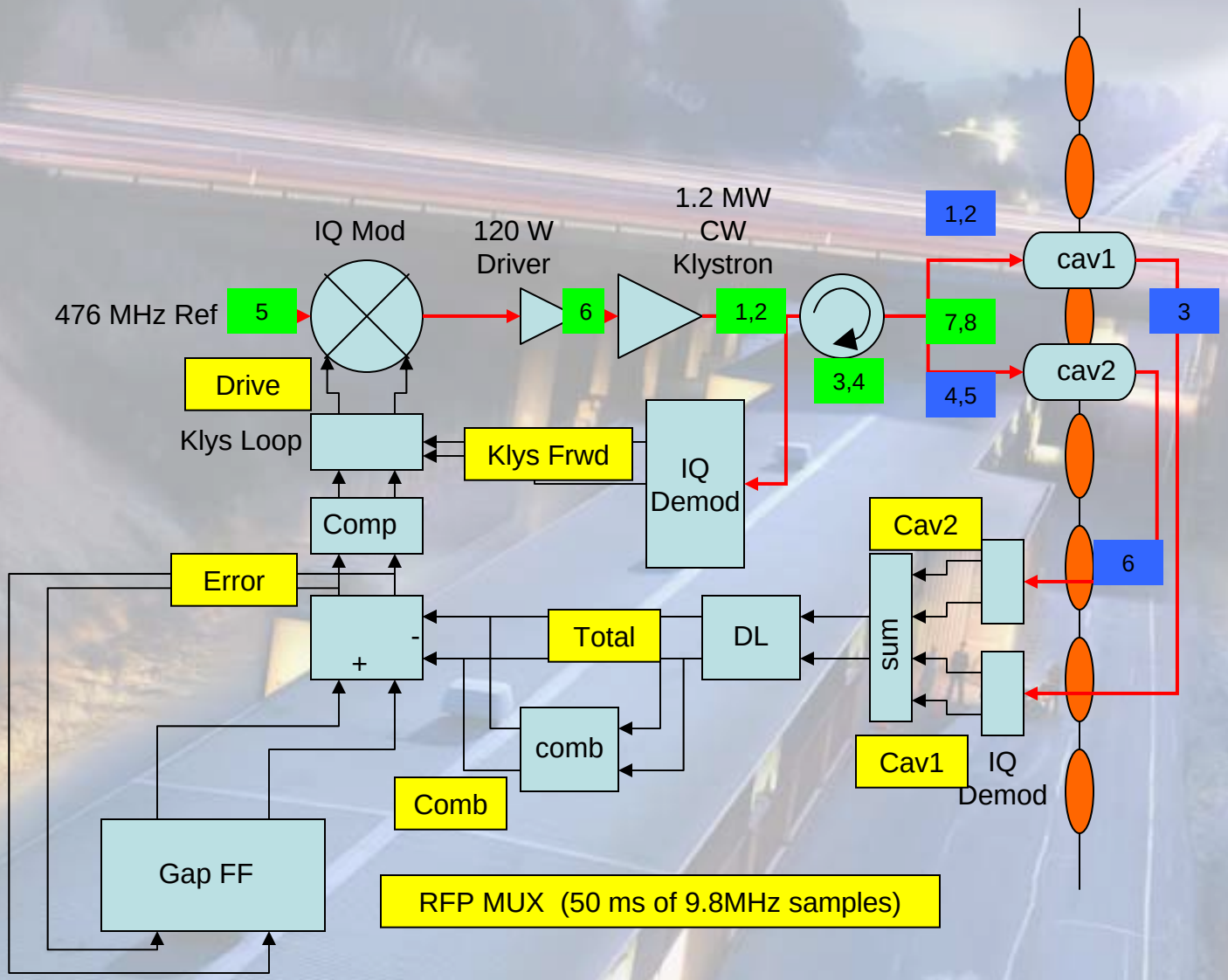
A Few Ideas from PEP-II

External Diagnostics

Dis-Advantages

- Expensive…involves capital purchase
- Limited recording of faults unless dedicated
- Can’t measure inside closed loop system easily
- If you don’t put in internal diagnostics, it’s very hard to put them in later…
- Conflicting needs with limited equipment (fist-fights)

PEP-II RF System Diagnostics



IQA 1

1. Klystron Forward
2. Klystron Reflected
3. Circ load forward
4. Circ load reverse
5. Reference input
6. Drive
7. Magic Tee frwd
8. Magic Tee rev

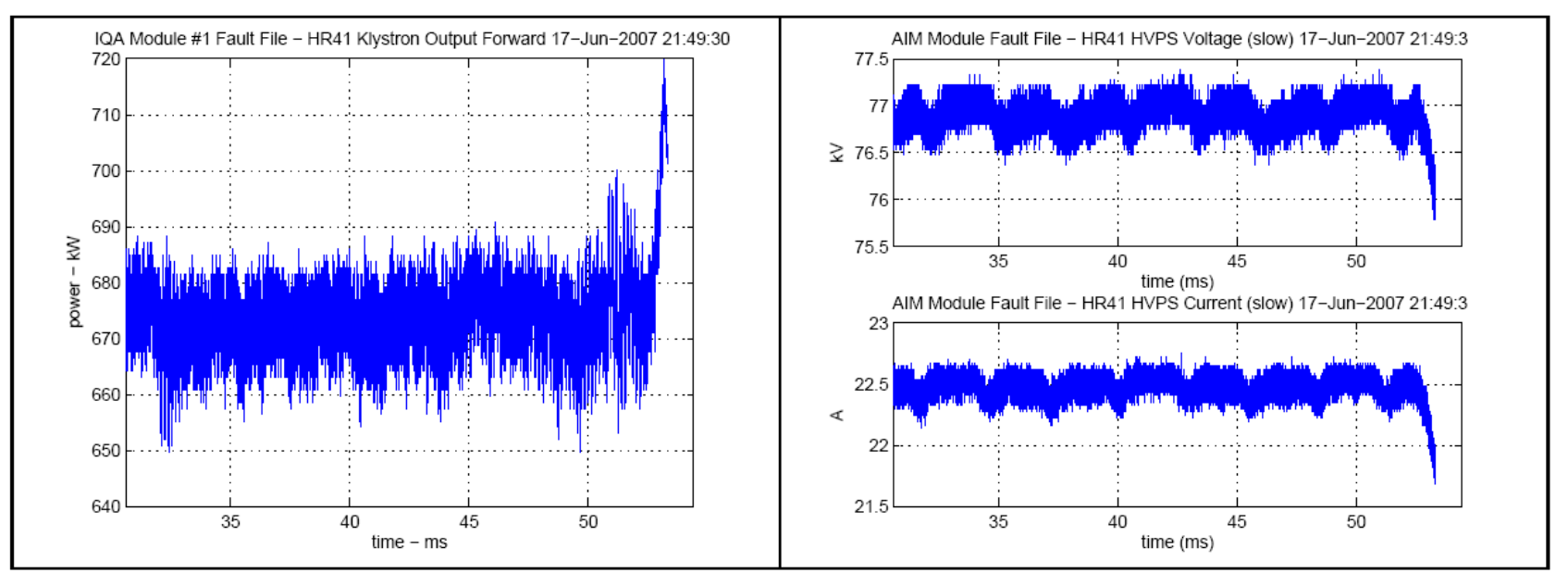
IQA 2

1. Cav1 Frwd
2. Cav1 Rev
3. Cav1 Probe
4. Cav2 Frwd
5. Cav2 Rev
6. Cav2 Probe

AIM Module

4 Channels of HVPS signals (I,V,fastI, fastV)

Example Plots



Example of External

- Transverse Feedback didn’t originally have fault diagnostics.
- After many aborts, 3 Gage boards were added and clocked at 238 MHz to capture abort events.
- Next Run we will add this same diagnostic to the longitudinal plane