

*NSF Workshop ~ 4-6 March 2007 ~
Brain Science at the Interface: Analysis of
New Opportunities*

**Measuring the Brain:
Of Synchronization and Signals**

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What signals synchronize circadian clocks in brain and body?

Circadian clocks are fundamental components in all cells/ tissues, but require orchestration by a master clock in brain, which also integrates inputs

- What intrinsic signals synchronize SCN cells?
- What diffusible signals from SCN synchronize peripheral clocks?
- What signals integrate SCN – other oscillator systems?
- What environmental signals – altered experience, seasonal change, food availability, social cues – synchronize circadian clocks?

How do nano-scale molecular protein dynamics signal in the brain?

- ◆ **Need:** Interactions of protein assemblies that mediate signaling not recapitulated in vitro – missing structured nano-environment within live neuron
- ◆ **Goal:** Non-invasive, real-time monitoring of multiple identified assembly elements in neurons of behaving animals – ‘far beyond FRET’
- ◆ **Outcome:** Novel insights into dynamics of protein systems signaling integrative brain functions & plastic tuning of cell state/ wiring in response to experience

