

Sponsored by      The **Kavli Nanoscience Institute at Caltech**  
                          The **Kavli Institute at Cornell for Nanoscale Science**  
                          The **Institute for Quantum Information at Caltech**  
                          The **Center for the Physics of Information at Caltech**

Organizers:        *Michael Roukes* (Caltech)  
                          *Keith Schwab* (Cornell)

Dates:              **13-14-15 December 2006**

Location:          **The Inn at Morro Bay, Morro Bay, CA USA** (innatmorrobay.com)

This workshop follows on the theme of the first QEM workshop held at Caltech in April 2001. QEM-2 will be a small "working meeting" focusing on universal challenges that currently confront the research community pursuing quantum limited measurements with nanoelectromechanical systems (NEMS). The format will be a series of half-hour presentations over three days that focus on state-of-the-art techniques, issues, fundamental physics, and potential applications in mechanically-based quantum measurement and information. Each presentation will be followed by up to a half hour of discussion. To facilitate lively and constructive interchange after each presentation, a separate moderator will join each speaker to stimulate the post-presentation discussion.

A non-exclusive list of possible topics includes. . .

- **Transduction at the Quantum Limit**
  - what is "measurable," limits of linear measurement
  - parametric amplification
- **Dissipation and Decoherence**
  - measurements of dissipation
  - lifetimes and coherence times for various states
  - what is the environment?
- **Coupling NEMS to Quantum Electronics**
  - NEMS coupled to SETs, qubits, Josephson Junctions, ect.
- **Coupling NEMS to Spins**
  - single-electron-spin magnetic resonance force microscopy
  - toward NEMS detection of single nuclear spins, what will it take?
  - direct detection at the Larmor frequency
- **QND, BAE, Squeezing**
  - QND coupling schemes
  - measurements schemes with high-Q electromagnetic resonators
- **Thermalization, Energy Transport, Active Mode Cooling**
  - optical dissipation
  - electron phonon-coupling in reduced dimensions
  - limits of back-action cooling
- **Quantum Information and Testing the Limits of Quantum Mechanics**
  - NEMS as qubit readout devices
  - NEMS as a bosonic bus, quantum memory
  - new decoherence mechanisms: e.g. spontaneous localization, gravitational collapse
- **Dynamics**
  - Non-linear response, mechanical bifurcation amplification
  - Coupling mechanics to inverted media (spins, SETs, ect.), i.e. "cantilasing"
  - Dynamics in optical fields and cavities

QEM-2 will be kept small to insure a vibrant and open exchange of ideas. Registration for open slots will be on a first-come, first-served basis until filled. The registration fee for the workshop is **\$550 USD** (paid in advance\*), which includes three night's lodging, continental breakfasts, box lunches, coffee breaks, and the conference banquet.



Cornell University  
Kavli Institute at Cornell



\*For more information please contact:

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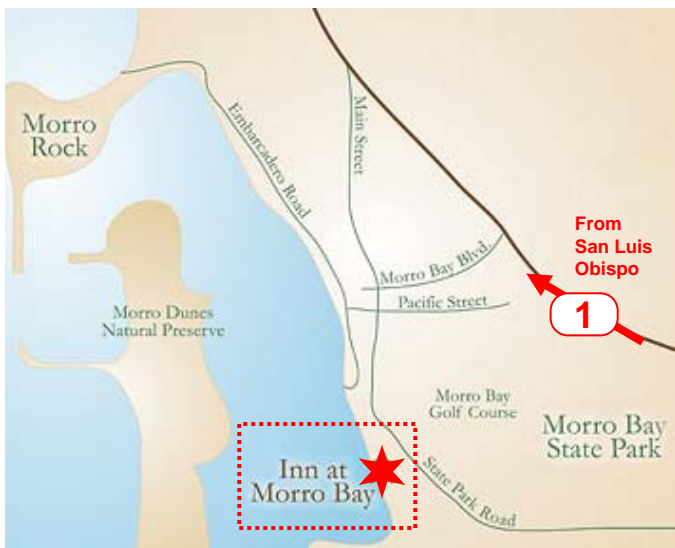
# Getting to QEM-2 at The Inn at Morro Bay



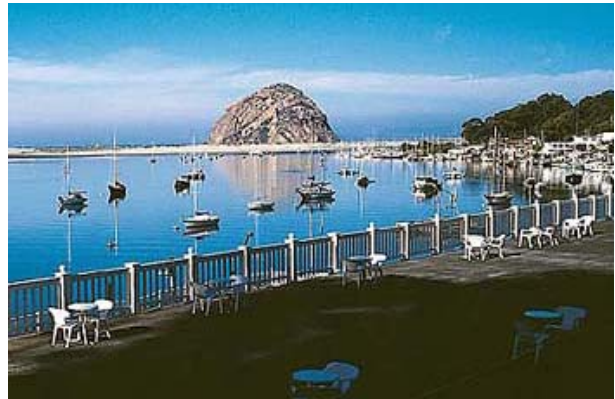
California Central Coast



San Luis Obispo, Airport & Morro Bay



Morro Bay, CA - detail



www.innatmorrobay.com

The Inn at Morro Bay is located on California's Central Coast, halfway between San Francisco and Los Angeles. It is nestled on 4,000 acres just inside Morro Bay State Park. For detailed directions see: [www.innatmorrobay.com/directions.asp.htm](http://www.innatmorrobay.com/directions.asp.htm)

Morro Bay is accessible via the San Luis Obispo County Regional Airport (SBP), located just south of the City of San Luis Obispo, and 16.5 mi from the Inn at Morro Bay. Regional flights into SBP are offered by American, from Los Angeles (LAX); by AmericaWest, from Phoenix (PHX) and Las Vegas (LAS); and by United, from Los Angeles (LAX) & San Francisco (SFO). For local flight schedules: <http://sloairport.com/flightinfo.htm>



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