Lecture 41

Field Operators

and

Problem Set 6
Where We Are

• Doing our projects!
• Using problem sets to solidify our knowledge base
• Following class lectures
• Seeing examples in class illustrate how to apply QM (the QM postulates) to problems
A set of quantum postulates

• There is a (normalized) state vector
• Unitary evolution of the state vector is generated by a Hamiltonian
• Measurements give eigenvalues of Hermitian operators and place the system in the associated eigenstate with its probability
• A composite state vector is represented in a basis that is an outer product of the basis sets of its component state vectors
The Five December Lectures

• Shor’s algorithm with all the trimmings
• The Q beamsplitter and teleportation using an interferometer
• Problems Set 6 Part I
• Factoring 15=5 times 3 using Q interference
• Problem Set 6.II and exam review
Wednesday’s Topic: The Beamsplitter

- Canonical quantization of a BVP
- Coherent states, energy conservation and the corresponding Wigner representations
- Quantized reflection and transmission
- Entanglement of squeezed states in Wigner representation
- Homodyne measurement
Today’s Topics

• Why are operators necessary?
• How can fields be operators?
• Operator gymnastics (P3)
• Schroedinger and Heisenberg pictures (P4)
• Expectation values in various field configurations (P5)