Part II Physics SSCC feedback surveys

We strongly encourage you to complete the feedback form for TP2 this term.

You can access the survey using the link below or the attached QR code:

https://cambridge.eu.qualtrics.com/jfe/form/SV_bQtlhPmYudc63gq?Q_CHL=qr

The survey is set to close on Sunday 16th March.

Summary of Lecture 13

- Density Operator $\rho = \sum_\alpha P_\alpha |\phi_\alpha\rangle\langle\phi_\alpha|$ $\quad 0 \le P_\alpha \le 1$ $\quad \sum_\alpha P_\alpha = 1$
- Pure vs. mixed states
- Expectation value $\langle A \rangle = \mathrm{tr}\left(\rho A\right)$
- Time evolution $\frac{\mathrm{d}}{\mathrm{d}t}\rho = -\frac{\mathrm{i}}{\hbar}\left[H, \rho\right]$
- Canonical Ensemble $\rho = \frac{1}{Z}\exp\left(-\beta H\right) \quad Z = \mathrm{tr}\left[\exp\left(-\beta H\right)\right]$
- Entropy $S = -k_\mathrm{B}\mathrm{tr}\left(\rho \ln \rho\right)$ ($S = 0$ for pure states)

This Lecture (14)

- Density Operators for Subsystems

Summary of Lecture 14

- Reduced Density Operator $\rho_A = \mathrm{tr}_B \left[\rho_{AB}\right]$

  [ρ_A can be mixed, even if ρ_{AB} pure]

- Entanglement entropy $S_{ent} = -\,\mathrm{tr}\left[\rho_A \ln \rho_A\right]$

- Thermalization and quantum damping of subsystems

  - Entropy growth
  - Decoherence

Next Lecture (15)

- Lie Groups

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