Questions – Week 3: Path integrals, states, and operators in QFT and path integral approach to Hawking radiation

January 29, 2016

1. What is the state ϕ from the point of view of operators ? Is it $\phi 0$? And what does it represent physically?
2. Does inserting operators into a path integral change the topology? If so, how does it change? If not, what does the word insertion really mean? E.g., see Eq. (4.10).
3. What boundary conditions do we normally put on the field in the path integral when we compute correlators?
4. A field in QFT is hermitian so is it an observable? Also do we know something about its eigenvalues and eigenstates?
5. How do we see Lorentz invariance of correlators from the path integral?
6. What boundary condition do we put on the field at $\tau \to -\infty$ when we compute the vacuum state? Also is there supposed to be a constant in the definition (the y_0 in the explanation)?
7. From how we defined the vacuum state in lecture 4 I would expect (5.5) to be the opposite. Is it something like the complex conjugate of what we want to compute?
8. How does he go from Eq. (5.7) to the statement that
$$\langle \phi_2 | \rho_A | \phi_1 \rangle = \langle \phi_2 | e^{-2\pi H_{\text{Rindler}}} | \phi_1 \rangle \ ?$$
9. As Unruh radiation ever been observed?
10. I am not sure to understand what he means by remnant states.