Quantum Fields in General Relativistic Systems

The best book on quantum fields in relativistic gravitational and accelerating systems seems to be *Introduction to Quantum Effects in Gravity*, Mukhanov, V., and Winitzki, S., Cambridge, 2007 (M&W). It is very well organized and, by most standards for physics texts, quite accessible. It is the text I would recommend for this subject. The authors have done a terrific job, and we owe them a debt of gratitude.

However, the text can be dense in places, as it covers a lot of ground in a thin book. At times, a significant number of steps are left out between lines (in more than one case, two to three pages of algebra). Terms and definitions of quantities are sometimes introduced with little justification or explanation why. Such things no doubt occur less in this text than many others, but they still tend to slow down the learning process.

In the links below, I provide notes on some of the more key chapters in M&W that may help speed up that learning process for some students. These notes include a good part of the algebra fitting between some lines in the text and more detailed explanations for certain concepts. Note that these chapter notes are generally not stand-alone documents, but meant to be used jointly with M&W.

As with my own text, I occasionally offer my opinion on certain facets of the theory, and these sometimes diverge a bit from the canon. This is not often, but when it occurs, I note it. In such cases, you the student should not accept what I propose, but think it through and come to your own conclusions.

One overview note: This text covers the treatment of quantum fields behaving in a background classical general relativistic system. Gravity (and acceleration) fields are considered classical; other fields as quantized fields which act within the classical gravitational (or accelerating) system.