Some Useful References

The following are some books that you might find useful:

A.A. Grib, S. G. Mamaev, V. M. Mostepanenko, *Quantum Effects in Strong External Fields* (Moscow, Atomizdat, 1980) (in Russian) [English translation: *Vacuum Quantum Effects in Strong Fields*, (Friedmann Laboratory Publishing, St.Petersburg, 1994)]. This is one of the earliest textbooks on the subject and is fairly good, though not as comprehensive as Birrell and Davies.

R. M. Wald, *Quantum Field Theory In Curved Space-Time And Black Hole Thermodynamics*, (The University of Chicago Press, 1994). This is the best book to consult for a detailed exposition of the precise mathematical formulation of a free quantum field theory in a general curved spacetime. It can be a challenge to relate the notation and formalism used by Wald to those more commonly used in the literature, but it is worth the effort if you are interested in the mathematical subtleties. This book does not contain much in the way of applications (other than Hawking radiation) or explanations and demonstrations of useful computational methods.

S. A. Fulling, *Aspects Of Quantum Field Theory In Curved Space-Time*, London Mathematical Society Student Texts 17, (Cambridge University Press, 1989). Like Wald's book, this book is focused on providing a precise mathematical formulation of the theory. It is however less successful in this regard than Wald.

V.F. Mukhanov and S. Winitzki, *Introduction to Quantum Effects in Gravity* (Cambridge University Press, Cambridge, 2007). This is a wonderful little book, just published, which manages to cover and explain most of the key physical effects we will be interested in their most simplified forms with a minimum of mathematical formalism. It cuts straight to the heart of the subject.

B. S. Dewitt, *The Global Approach to Quantum Field Theory*, Volumes 1 and 2 (Oxford University Press, 2003). This is a 2 volume general textbook on quantum field theory, by one of the early pioneers of quantum gravity, which contains a lot of material on quantum fields in curved spacetime.

L. Parker, D. Toms, *Quantum Field Theory in Curved Spacetime: Quantized Fields and Gravity*, Cambridge Monographs on Mathematical Physics, 2009. This book is due to become available in September, and the table of contents on amazon.com indicates that it is comparable to Birrell and Davies, though more up to date and with more details in some areas. I've preordered a copy and will update this review when it arrives.

W.H. Louisell, *Quantum Statistical Properties of Radiation* (John Wiley and Sons, 1973). This is a classic textbook on quantum optics, chapter 3 of which contains a

wealth of material on operator algebra which will be useful for our computations of scattering matrices.

A.R. Liddle and D.H. Lyth, *Cosmological Inflation and Large Scale Structure*, Cambridge University Press, Cambridge, 2000. This book is a good reference on generation of primordial perturbations, and contains many more details than we will cover.

S. Weinberg, *Cosmology*, Oxford University Press, Oxford, 2008. This is a general textbook on cosmology, with a couple of chapters that contain a nice minimal treatment of cosmological perturbation theory and inflation.

There are also quite a number of review articles on the subject that you can consult. Some good ones are

T. Jacobson, *Introduction to Quantum Fields in Curved Spacetime and the Hawking Effect*, gr-qc/0308048, and references therein.

L. Ford, *Quantum Field Theory in Curved Spacetime*, gr-qc/9707062.

There is also a nice introductory chapter on the subject in Carroll's general relativity textbook [S. Carroll, *Spacetime and Geometry: An Introduction to General Relativity*, Pearson Addison Wesley, 2003.]