

Preface

These notes have been written for a University course in Physics and Astronomy, that I taught for some years in Milano. The title is very similar to the one of the famous Rybicki and Lightman book (*Radiative Processes in Astrophysics*), and not by chance, since it hopes to have the same intuitive insight and attention for the physical concepts, rather than for difficult mathematical demonstrations. The aim of the book is to guide the students through the first steps in high energy astrophysics. As such, it requires some, but not much, previous knowledge of general and classical astronomy.

I think that the study of rather violent cosmic phenomena, born when we could open other electromagnetic windows besides the visible band, has been very important, enjoyable and productive, and it will continue to be so in the future, hopefully also when the non-electromagnetic messengers (neutrinos and gravitational waves) will be finally routinely detected. In general, these violent phenomena are associated to strong gravity, but also to fast velocities of extended objects. For this reason I included an entire chapter dedicated to the use of special relativity with extended objects. I hope it helps to clear up some confusing notations and formalisms.

Another field of interests in high energy astrophysics concerns the processes involving electron and positron pairs, to which I dedicate another chapter. The last chapter of the book is dedicated to active galactic nuclei. This is thought as illustrative of all the processes explained in the first part of the book. It is then a good field of research where we can apply the basics just learnt.

The style of the book has been intentionally kept rather informal, hoping that this helps the understanding of the basic concepts, leaving to other books the duty to offer more specialized material for the interested reader.

Finally, I would like to thank the three teachers of my scientific youth: Laura Maraschi, Roland Svensson and Andy Fabian.

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