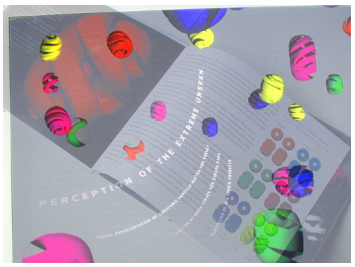
the book proposal

perceptions of the extreme unseen

http://www-personal.umich.edu/~janhande/sizedmatter/sizedmatter.htm

dr. gordon kane, dr. david gerdes - physicists
dennis miller, jan-henrik andersen - designers



We propose to publish a book that, as a combination of science and art, is at once visually and scientifically exciting, and accessible to a huge and eager audience. The book is the result of a three-year collaboration of two designers and two physicists, and we're open to discuss the proposal with publishers.

The result of this collaboration of talents opens up a new vista by showing conceptual images of the sub-atomic particles (the particles of which atoms are made) and providing explanations of their role in forming our complex world--explanations that are both verbal and visual. The resulting book will be attractive to many people who are eager to better understand our world, or who want beautiful representations of basic aspects of nature. There are few such books. Those that are closest usually emphasize the history, and use mainly historical photos, rather than describing and explaining the science of the particles and providing powerful new images related to the science. The book that comes closest is "The Universe in a Nutshell", by Stephen Hawking, which has a narrow and personal focus instead of covering the whole particle physics field. The famous drawing of electrons in orbit around an atom has become an icon that visually generalizes atomic physics. In this physics/art collaboration, industrial designer Jan-Henrik Andersen has created computer-generated images that visually generalize the essential nature of sub-atomic particles by showing how they vary from each other in characteristics such as mass and spin. Andersen's images may become the icons that visually aid understanding and admiration of the sub-atomic world. Like the electron-orbiting-the-atom drawing, these are images are representations, not photos. Photos of galaxies are made by NASA, but only artists can make representations of particles.

Graphic designer Dennis Miller has created a font (he named it "Atomic") based on Andersen's basic particle form. This font, which has already won a national design prize, and a page layout which is organic to the collaborative venture, maintains a singular visual imagery throughout the book.

Dr. David Gerdes is an experimental particle physicist who works with the methods needed to see the particles. Dr. Gordon Kane is a theoretical particle physicist who works on the theories needed to understand the particle phenomena. They provided knowledge and inspiration to spur the project, to guarantee accuracy in the new visual concepts, and to write the text. All the authors are leading experts in their areas.

Let us describe briefly the theme and contents of the book here. In the past century we have learned that we are made of atoms, and that atoms are in turn made of electrons and nuclei, nuclei of protons and neutrons, and protons and neutrons of quarks and gluons. Today we can not only think about these tiny constituents, or particles, we can "see" them. We have very good reasons to think these are the true fundamental constituents that nothing else will ever be found as we probe more deeply.

The illustrations and text in this book, in addition to presenting Andersen's representations of particles, will also attempt to capture a sense of the vast ranges of time and distance that modern particle physics explore. For example, the top quark, one of the most unstable particles, lives less than a trillionth of a trillionth of a second before it decays.

The blink of an eye takes up much more than this fraction of the age of the universe. Yet the top quark is an object of detailed study at present experiments. At the other extreme, grand unified theories predict that the proton has a lifetime roughly a trillion trillion times the age of the universe.

Experiments are testing this prediction too -- we have learned how to "see" protons decay. In addition, the impressive physical size of particle detectors, some of which are the size of five-story buildings and weigh hundreds of tons, yet made of millions of sophisticated electronic components, is essential to see the individual elementary particles they study.

The book will be built from largely self-contained modules like the facsimilie below, probably 15-20 of them. We imagine at most about 200 pages, and we can be flexible about such issues. Readers with no previous exposure to these areas can get the needed background to understand any module from the first few, and those who have already read a little about these areas can read any of the modules, one at a time.

Thus the book can have roles ranging from coffee-table to university (and even advanced high school) courses, as well as being a beautiful general interest book. Its potential market is very large.