atom is trapped and thus overlapping the deBroglie waves of atoms trapped in neighboring potential minima of that standing wave; consequently the atoms form a coherent state and the recoil momentum is no longer absorbed by the emitting atom alone but distributed over all. (At these low velocities the kinetic energy of an atom is less than the variation in its internal energy with position in the laser standing wave, so that the atom becomes trapped in one of the valleys in the figure.) Cohen-Tannoudji relates in a brief epilogue (1994) that creating extensive arrays of laser trapped and cooled atoms in coherent states and investigating their properties is the exciting program in which he is now engaged.

Paul Forman
National Museum of American History, Washington, DC 20560, USA

■

Galaxies

Carnegie Atlas of Galaxies. ALLAN SANDAGE and JOHN BEDKE. Carnegie Institution of Washington, Washington, DC, with the Flintridge Foundation, 1994. In two volumes. viii, 750 pp., illus. $95.

In 1936 Edwin Hubble wrote, "We know our immediate neighborhood rather intimately." "Immediate" and "intimate" are odd words to apply to a region a hundred million light years across. Now *The Carnegie Atlas of Galaxies* makes Hubble's statement seem eminently reasonable. The atlas is a work of art. Nowhere are the grandeur and aesthetic appeal of the cosmos more elegantly displayed. The images of the galaxies are mesmerizing—it is easy to spend hours paging through the two exquisite volumes.

The authors, Allan Sandage and John Bedke, describe the atlas as a guide to the classification and detailed properties of more than a thousand nearby galaxies. From the nearly featureless elliptical galaxies to spectacular spirals to the messes called irregulars, the verbal descriptions of the galaxies are clear and concise. The photographs are so cleanly reproduced that the salient features of any particular galaxy are obvious even to the uninitiated. The choices of contrast, scale, and positive or negative images masterfully enhance the clarity of the verbal descriptions. For the researcher, the atlas is an invaluable aid in developing research projects on nearby galaxies. Perhaps these volumes will inspire a solution to the nagging puzzle What causes the range of morphologies of galaxies?

NGC 5426/5427. Both these galaxies "have normal Sbc morphologies. They evidently form a physical pair. . .The only evidence for a close tidal encounter are the two thin straight strands of the multiple outer arms of NGC 5426 that overlap the outer thin spiral arms of NGC 5427, which are of the grand design." [From *Carnegie Atlas of Galaxies*]

The *Carnegie Atlas* is the culmination of an ambitious project with a distinguished pedigree. From 1919 to 1948 Hubble used the 60-inch and 100-inch telescope on Mount Wilson to photograph bright galaxies to explore and to define their "family traits." Hubble was unable to complete his atlas before his death in 1953. In 1961 Allan Sandage completed the now classic *Hubble Atlas of Galaxies*, which includes famous photographs of galaxies by Hubble and by Sandage himself. The *Carnegie Atlas* builds on (and includes) the *Hubble Atlas*. The photographs are a unique historical record of the exploration of the nearby universe—of people and of telescopes.

Taking the photographic plates at the telescope was only the crucial first step in the production of the new atlas. Many of the photographic plates are as large as 20 by 20 inches (51 by 51 centimeters), and a specially equipped lab is necessary to print the images for wide accessibility. John Bedke met the challenge of organizing and directing a photolab at the Space Telescope Science Institute where the extraordinary requirements of the atlas could be met. The crisp image of single spiral galaxy filling the 17 by 13½ inch printed page is simply awe-inspiring.

The authors write, "The intent is that volumes reach the hands of the young astronomers who will produce the coming spectacular developments in the next century." Perhaps this goal is too modest. Because of the generous subsidy provided by the Flintridge Foundation, the first printing is available for a small fraction of the commercial cost of such high-quality printing. The *Carnegie Atlas* should be in art museum shops along with other collections of famous photographs. For the professional or amateur astronomer the atlas is a must. Copies in high school libraries would inspire any imaginative young person, science-oriented or not. In fact, a brief, informal guide for young people (and their teachers) would be a valuable companion to the atlas.

Margaret Geller
Harvard-Smithsonian Center for Astrophysics, Cambridge, MA 02138, USA

NGC 1187. The inner-arm pattern of this galaxy "is composed of three high-surface-brightness grand design spirals. Each begins near the small central nucleus. . .The two principal arms of the inner triad pattern can be traced for about three-quarters of a revolution outward before they abruptly decrease in surface brightness." [From *Carnegie Atlas of Galaxies*]

■

Millennia of Star Study

The Norton History of Astronomy and Cosmology. JOHN NORTH. Norton, New York, 1995. xviii, 697 pp., illus. $35 or $C45; paper, $18.95.

Almost a half-century after the Dutch astronomer Antoine Pannekoek published the last widely disseminated single-author general history of astronomy (translated into En-