There followed almost two decades of accelerator-based discoveries of other subatomic particles originally thought to be elementary, notably the antiproton and the vector mesons. Most of these particles have since turned out to be composites of quarks. After 1970 colliders—machines using two accelerator beams in collision—entered the picture. Since then most, but certainly not all, new revelations in particle physics have come from these colliders.

IN CONSIDERING the evolution of accelerator and collider technology, we usually think first of the available energy such tools provide. Fundamentally, this is the way it should be. When the study of the atomic nucleus stood at the forefront of "particle physics" research, sufficient energy was needed to allow two nuclei—which are positively charged and therefore repel one another—to be brought close enough to interact. Today, when the components of these nuclei are the main objects of study, the reasons for high energy are more subtle. Under the laws of quantum mechanics, particles can be described both by their physical trajectory as well as through an associated wave whose behavior gives the probability that a particle can be localized at a given point in space and time. If the wavelength of a probing particle is short, matter can be examined at extremely small distances; if long, then the scale of things that can be investigated will be coarser. Quantum mechanics relates this wavelength to the energy (or, more precisely, the momentum) of the colliding particles: the greater the energy, the shorter the wavelength.