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Gravitational-wave research as an emerging field in the Max Planck Society: the long roots of GEO600 and of the Albert Einstein Institute. (English) Zbl 1472.83004

Summary: This chapter explores the interplay between the renaissance of general relativity and the advent of relativistic astrophysics following German involvement in gravitational-wave research through the window of the Max Planck Society, from the very first interests of its scientists, to the point when gravitational-wave detection became established by the appearance of full-scale detectors and international collaborations. On the background of the spectacular astrophysical discoveries of the 1960s and the growing role of relativistic astrophysics, Ludwig Biermann and his collaborators at the Max Planck Institute for Astrophysics in Munich became deeply involved in research related to such widening horizons, already unveiled by radio astronomy during the 1950s. At the end of the 1960s, Joseph Weber’s announcements claiming detection of gravitational waves sparked the decisive entry of this group into the field with a threebranched approach: experimental detection, statistical analysis of the results, and a deep theoretical footing in general relativity with the appointment of Jürgen Ehlers, coming from Pascual Jordan’s school in Hamburg, one of the centers of the renaissance of general relativity. The Munich area group of Max Planck institutes provided the fertile ground for acquiring a leading position in the 1970s, facilitating the experimental transition from resonant bars toward laser interferometry and its innovation at increasingly large scales, eventually moving to a dedicated site in Hannover in the early 1990s. The scales by then demanded the formation of international collaborations. An early pan-European initiative broke up into two major projects: the British-German GEO600 and the French-Italian Virgo. The Hannover group emphasized perfecting experimental systems at pilot scales, and never developed a full-sized detector, rather joining the LIGO Scientific Collaboration at the end of the century. In parallel, the Max Planck Institute for Gravitational Physics (Albert Einstein Institute) had been founded in Potsdam with a theoretical and computational emphasis. Both sites, in Hannover and Potsdam, became a unified entity in the early 2000s and were central contributors to the first detection of gravitational waves in 2015.

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