

Review of Density Wave Observations

Ronald J. Allen (Space Telescope Science Institute)

Observational support for the Density Wave Theory received an important boost with the advent of the multi-channel spectrograph on the Westerbork Synthesis Radio Telescope in the early 1970's, and the (now-iconic) image of the 21-cm HI velocity field of the galaxy M81 produced by this instrument has remained one of the prime pieces of evidence in support of the theory. The author's role in linking theoreticians and observers during that period will be described. Subsequent decades have seen significant improvements in angular resolution and sensitivity of the instruments, yet no additional examples to rival the grand design of M81 have been presented. Instead, the closer we look, the more complicated the observational story seems to become. The waters have been further muddied with a plethora of N-body computer codes favoring this or that mechanism for the origin and maintenance of spiral structure. Finally, to confuse the story even more, evidence has slowly been accumulating that observers can no longer ignore the basic physics of the ISM tracers they use.