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The roots of LIGO data analysis and the GW pulsar challenge

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Meeting the technical challenges of building sensitive broadband gravitational wave detectors like LIGO and Virgo extends to searching their data as deeply as possible, finding weak signals buried under instrumental noise. Today this task employs big resources, both human and computational. Peter Kafka and Kip Thorne first raised awareness of the possibilities and necessity of this effort in the 1970s and '80s. I will survey how the foundations of today's methods were laid during the late '80s and early '90s, with coordinated discussions among both the interferometry groups and the bar detector groups at the time. This led to the first joint interferometric data run, the so-called '100 hour run' of the Glasgow and Munich prototypes. I will then focus in on the most difficult data challenge of all, the search for gravitational wave pulsars. LIGO's upper limits so far have revealed how surprisingly smooth neutron stars are, despite their having a semi-solid crust. As search sensitivities improve, the first positive detection will give us exciting and fundamental new insights into the exotic physics of neutron stars.

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