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Doublet Dudes: Shaping the Future of Fusion

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The pursuit of controlled thermonuclear fusion to generate energy is currently one of the largest scientific collaborations in the world. Yet, compared to other big science endeavors of the 20th and 21st centuries, the history of nuclear fusion research is distinct because it persisted as small competitive programs across national laboratories well into its middle age before becoming the modern international effort to construct the most expensive science project in the history of the world. Unlike other scientific collaborations with more fixed goals, such as the Manhattan Project, the engineering problems of fusion research present the opportunity for many different simultaneous and creative approaches. During the 1950s and 60s, each national lab participating in fusion research had its own machine or approach that capitalized on different physics, however, in 1968 the Russian tokamak achieved order of magnitude higher temperatures forcing the US to kill many of its smaller programs and machines to catch up on building tokamaks. During this fever, The Doublet Dudes (Dr. Tihiro Ohkawa and Torkil Jensen) at General Atomics, guided by their experiences on Magnetohydrodynamic (MHD) stability with the DC Octopole, defiantly put a twist on the tokamak with the plasma-current multipole or Doublet. The flexibility and capabilities of the doublet grew through three iterations from a small tabletop machine to the basis for DIII-D, currently the only mid-size tokamak in America. Along the way, the innovations of the Doublet Dudes would go on to challenge and progress the fusion subfields of plasma control and shaping. To this day, the challenges posed in the doublet design are used by some researchers to challenge and understand the limits of modern algorithms for control and field reconstruction, and while the dedicated doublet may have died in 1983, its impact has given shape to the modern field of fusion.