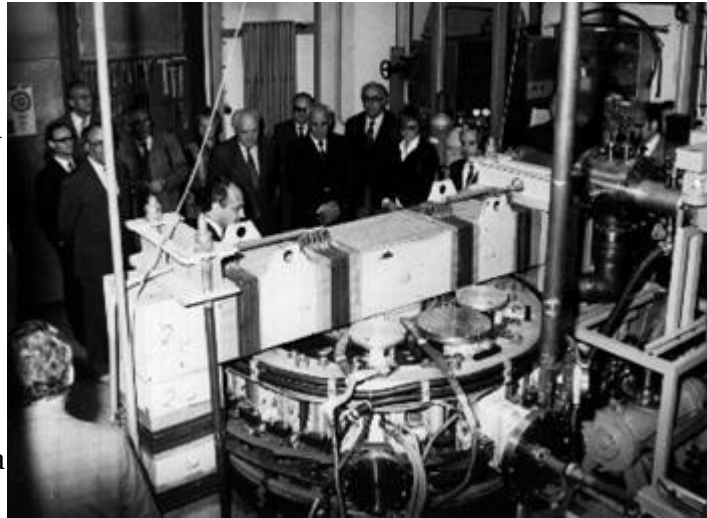


GOLEM history

Jan Mlynar, November 2010

- The GOLEM tokamak was built as TM-1 (Tokamak Malyj – meaning „a small tokamak No 1“) in Moscow in 1960 (according to Braams, Stott book on Nuclear Fusion) so TM-1 was the third tokamak after T-1 and T-2 (not counting some early tabletop experiments with high toroidal field and induced current, see the book). Nobody knows what happened to the first two bigger machines, probably were scrapped, while TM-1 was lucky as Arcimovich (responsible for fusion research then, under Kurchatov nuclear research) let it to another department in Moscow to do research on plasma – radiofrequency wave interaction. Prof Razumova, a Russian woman physicist who is



quite famous for her discovery of stable tokamak regime on TM-2 (TM-2 had higher toroidal field than TM-1) and who is even in her 80s still active in research told me the following anecdotal story on TM-1: Arcimovich did not want to give TM-1 to the RF department, so the TM-1 operators forged a letter from Princeton saying PPPL would love to get TM-1 and when Arcimovich was so proud and happy to send it to USA they told him, well, it is us who wrote it but if you were ready to give it to the US, why aren't you happy to give it to the RF department of our institute? In fact, tokamaks (that had started their history in Moscow basically in order to validate so called Kruskal-Shafranov condition on plasma stability, while the mainstream research – Kurchatov, Arcimovich - believed pinches would become first fusion reactors) have earned world interest only after 1968 thanks to T-3, see e.g. <http://www.jet.efda.org/jet/news/2005/11/success-of-t-3-breakthrough-for-tokamaks/>

In approximately the same time, in late 1960s, in my institute IPP Prague there was a quite influential group of theorists who published articles on possibility of RF current drive. Thanks to this, the RF department of the Moscow institute (nowadays Kurchatov Institute) offered us TM-1 for free to test our theories. The machine was reinstalled in Prague in 1977 as TM-1MH and later (in particular to get good diagnostic ports and get rid of the copper stabilising wall, to replace it with feedback system) completely refurbished and started as CASTOR in 1984. Main experimental research was into edge turbulences and, indeed, RF (lower hybrid) current drive. It worked in IPP Prague until 2007 but due to its small size and circular, „limiter“ plasma its potential for ITER-relevant research was next to nothing. Therefore we were happy to get the bigger and moder UK tokamak COMPASS instead. Lybia and some other places indicated interest in CASTOR as well as Technical University in Prague who just started a new programme for Master studies in thermonuclear fusion, and needed a hands-on experiment. Of course IPP preferred to have the old machine here in Prague, partly because our senior experts are so happy they can see it still alive and useful. Before installation in the Technical University (in an old cellar really, that had to be refurbished) it waited for a couple of winter months under a tent. The new location is just next to the old Prague Jewish cemetery where Rabi Loew (Golem builder) is buried, and that is why it was renamed GOLEM (and also for the symbol of potential power you get if you know the magic). Interestingly, here in Prague, where the Golem legend originated, Golem is not perceived as a symbol of evil, but rather as a symbol of power which might be useful but is very challenging to handle. To learn more of the Golem legend, see e.g. wikipedia.