Comparison table of Spherical Tokamaks **See www.tokamak.info for latest version and explanation of figures. Please send feedback to nick@tokamak.info**

Name, links and pictures	Location	Operating	Aspect ratio	Major radius (m)	TF (tesla)	IP (MA)	ECH (MW)	ICH (MW)	NBI (MW)	LH (MW)	Notes and special features
ACST (Alternating Current Spherical Tokamak)	S Korea, Seoul	2000-2002	2	0.06	0.02	0.0005	-	-	-	-	AC operation. Helicon plasma discharge.
Asperator T-3	Japan, Tohoku	1974	1.6	0.27	?	0.1	-	-	-	-	
BATORM (BAby TORoidal of Masoud)	Egypt, Cairo	1998	2	0.06	?	?	-	-	-	-	A very small tokamak used for materials testing and tokamak physics studies.
CDX-U, (Current Drive Experiment)	USA Princeton	1993-2004	1.4	0.3	0.23	0.03	-	-	-	-	FW heating. Now resurrected as the Lithium Tokamak Experiment, LTX.
CPD Compact Plasma wall interaction Device	Japan Kasuga City	Approx. 2007	1.5	0.3	0.3	0.15	0.2	-	-	-	New spherical tokamak at Kyushu University. Only four TF coils, but they are large enough to give a tolerable ripple (8% at r = 0.5m). Includes a thermal lithium beam diagnostic for 2-D density. Also studying non-inductive start-up using ECRH.
ETE(Experimento Tokamak Esférico)	Brazil INPE	2000	1.5	0.3	0.6	0.4	-	-	-	-	Limiter machine
GLAST(Glass Spherical Tokamak)	Pakistan, Islamabad		1.7	15	0.4	0.05	-	-	-	-	MHP model validation and plasma-wall interactions
Globus-M	Russia IOFFE	2002	1.5	0.36	0.62	0.5	-	1	1.5	-	0.3 second pulses
GUTTA (at IOFFE)	IOFFE	1980-1985	2	0.16	1.5	0.15	0.03				Russia's first spherical tokamak.
GUTTA (at St Petersburg University)	Russia St Petersburg State Univ.	2004	2	0.16	1.5	0.15	0.03				Formerly operated at IOFFE Institute. Operations restarted 2004 in St Petersburg State University. Start-up and ECRH studies.
HIST	Japan Himeji	1998	1.3	0.3	0.2	0.1	-	-	-	-	
HIT2 (Helicity Injected Torus)	USA Seattle	1997-2004	1.5	0.3	0.5	0.225	-	-	-	-	Limiter / single null divertor machine to study Coaxial Helicity Injection (CHI).
HSE (Heidelberg Spheromak Experiment)	Germany, Heidelberg	1986 - 1987	1.1	0.08	0.25	0.1	-	-	-	-	Heidelberg Spheromak Experiment was converted with an axial conductor to a Spherical Tokamak, and operated in this configuration for only a short time, 1986-7. This was the first spherical tokamak experiment at the several kG and 100 kA level. (Spheromak generated by theta-z-pinch method (equipped with axial conductor. Full diameter of plasma: 0.3m, length of discharge vessel: 1m, Formation of plasma: ~14-20 microseconds, lifetime of plasma after formation: ~40-50 microseconds, magnetic energy content (in plasma ring): 600 J, electron temperature estimate: 15-20 eV.) Thanks to Hardo Bruhns for this information.
KTM, (Kazakh Tokamak for Material studies)	Kazakhstan, Kurchatov	2011	2	0.9	1	0.75		5			Low aspect ratio spherical tokamak for material testing. Will be able to exchange the divertor plates without breaking vacuum. 20 single turn TF coils. Thanks to Alexey Kirilenko for recent information.
LATE(Low Aspect ratio Torus Experiment)	Japan, Kyoto Univ.	2000	1.25	0.25	0.12	0.004	0.2				
LTX (Lithium Tokamak Experiment)	USA, Princeton	2005	1.5	0.4	0.4	0.4	-	-	-	-	Liquid lithium walls. FW heating.
MASTMega Amp Spherical Tokamak	UK Culham	1999	1.4	0.85	0.5	1.4	1	-	4	-	Merging compression technique to drive plasma current, saving solenoid flux.
MAST-U (Mega-Amp Spherical Tokamak Upgrade)	UK Culham	2017	1.4	0.85	0.84	2	?	-	?	-	Major upgrade of MAST, with longer pulses, upgraded central column and neutral beam heating, with new 'super-X' divertors.
MEDUSA (Madison EDUcational Small Aspect ratio)	USA, Madison	c 1994 - ?	1.5	0.12	0.45	0.04	-	-	-	-	Test bed for educational purposes and studies leading to the construction of PEGASUS.

Note! All figures are approximate and optimal (not necessarily realistic or simultaneously achievable).

NSST (Next Step Spherical Torus)	USA, Princeton	?	?	1.5	2.7	5 to 10	?	?	?	?	Proposed as the step between today's spherical tokamaks and a large Component Test Facility (CTF). Possibly to use the site that was previously used for TFTR.
NSTX	US Princeton	1999 – 2010	1.32	0.854	1	1	-	3 HHFW	7.5	-	1 second + pulses. In 2009, 94.3 Million USD NSTX Upgrade project was started. See NSTX-U
NSTX- U	US Princeton	2015	1.5	0.934	0.55	2	-	6 HHFW	15	-	The upgrade to the original NSTX increased the size and capability of the centerstack and added a second neutral beam. The construction phase began in October 2011. The NSTX-U first plasma was completed in August 2015 successfully concluding the upgrade project. The first experimental run campaign in the new configuration took place in 2016 with 10 run weeks completed by June 30, 2016.
NUCTE-ST	Japan, Nihon Univ.	1998	1.2	0.062	0.45	0.34	-	-	-	-	High elongation machine (10)
PEGASUS	USA Madison	1996	1.1 - 1.2	0.2 - 0.45	0.18	0.1 - 0.3		2			Extremely low aspect ratio tokamak. Double null divertor. EBW heating.
Proto-SPHERA	Italy Frascati	Soon	1.2 - 1.3	0.35	?	0.24	?	?	?	?	Uses START vacuum vessel.
QUEST (Q-shu University Experiment with steady-state Spherical Tokamak)	Japan, Kyushu Univ., Kasuga City	2008	1.7	0.68	0.25	0.02					New spherical tokamak replacing TRIAM-1M. Mission to study issues related to steady-state operation within the All-Japan ST Research Program. In particular, to develop a fully non-inductive current drive scheme that is effective in ST plasmas with high beta and high dielectric constant; to perform integrated studies of recycling and advanced PWI control in steady state, by active control of wall temperature and divertor pumping, and compatibility with high plasma performance; to develop a divertor in ST magnetic configuration which can handle power and particle fluxes in steady state.
ROTAMAK	Australia Lucas Heights	1987-1997	1.1	0.07	0.02	0.003					Rotamak with central rod.
ROTAMAK	Australia Flinders	1998-2002	1.6	0.1	0.016	0.012					Rotamak with central rod.
SPHEX	UK Manchester	1991	1.05	0.23	0.045	0.2					Spheromak, fitted with TF rod in 1991.
ST25	UK Culham	2012	2	0.25	0.2	0.02	0.03	-	-	-	ST25 stands for Spherical Tokamak major radius 25cm. The term 'ST' is marginal - as it has aspect ratio 2, for reasons explained below. It is formed from copper cable TF , solenoid and PF magnets and powered by high capacity 'supercapacitors'; this combination gives the potential for long pulses - 2s to date, soon to be extended to 5s. A 3kW continuous wave magnetron is used to pre-ionise and study EBW (Electron Bernstein Wave) current drive using an inside-launch port. Unusually, the whole table-top device is contained in a small room and powered from only a 32A 415V supply. Thanks to Alan Sykes of Tokamak Energy for these details
ST25 HTS	UK, Milton Park, Abingdon	2015	2	0.25	0.4	0.02	0.03	-	-	-	A new version of ST25 using high-temperature superconducting coils, built by Tokamak Energy and still under development. The TF coils are cooled to 20K by a cryo-free system. Now claims the world record for the longest duration tokamak plasma at 29 hours, set in July 2015. The discharge was driven by a 600W RF supply but the plasma current has not yet been measured. There is considerable skepticism about this claim – see the records page. Further operation is planned, using a 2.45 GHz heating and current drive system.
START	UK Culham	1991-1998	1.25	0.3	0.5	0.31	-	-	1	-	First 'hot' ST, achieved world record betaT =40%. To ENEA Frascati June 2004 for use in Proto-Sphera
STPC-EX	Turkey, Ankara		1.5	0.084	0.12	0.0065	-	-	-	-	
SUNIST (Sino UNIted Spherical Tokamak)	China, Beijing	2003	1.3	0.3	0.15	0.05	-	-	-	-	Double null divertor / limiter. 0.2MW of EBW heating. ECRH heating system mainly used for pre-ionisation. Currently installing a 0.5 to 1MHz, 100kW, power supply and antenna for Alfven Wave heating and current drive.
TS-3	Japan Tokyo	1986	1.4	0.2	0.2	0.3	-	-	-	-	Limiter machine
TS-4	Japan Tokyo	2000	1.2	0.55	0.5	0.08	-	-	-	-	Limiter machine
TST-M	Japan Tokyo										

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TST-2(Tokyo Spherical Tokamak)	Japan Tokyo	1999	1.5	0.38	0.4	0.2	0.2	-	-	-	Major upgrade of TST-M. Double null divertor / limiter. 0.2 sec pulses. Studying plasma turbulence. Upgrades to heating and current drive systems planned soon.

Key to colour code
Currently operating
Under construction
Planned
Currently not operating
Unknown status
Decommissioned or 'dead'

Conventional Tokamaks
are covered in a separate table.
Follow the link at www.tokamak.info.

Key to Abbreviations

DNB: Diagnostic Neutral Beam. ECH: Electron Cyclotron Resonance Heating. FW: Fast Wave. IB: Ion Bernstein Wave. ICH: Ion Cyclotron heating. IP: Max plasma current. LH: Lower Hybrid Current Drive. NBI: Neutral Beam Injection. SC: Superconducting. TF: Toroidal Field.
"y" means yes, but that no details have been obtained.
Blank boxes mean that I simply don't know!

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