

**CPC****COOPERATIVE PATENT CLASSIFICATION****H05H**

**PLASMA TECHNIQUE** ( fusion reactors [G21B](#) ; ion-beam tubes [H01J 27/00](#); magnetohydrodynamic generators [H02K 44/08](#); producing X-rays involving plasma generation [H05G 2/00](#) ); **PRODUCTION OF ACCELERATED ELECTRICALLY-CHARGED PARTICLES OR OF NEUTRONS** ( obtaining neutrons from radioactive sources [G21](#) , e.g. [G21B](#) , [G21C](#) , [G21G](#) ); **PRODUCTION OR ACCELERATION OF NEUTRAL MOLECULAR OR ATOMIC BEAMS** ( atomic clocks [G04F 5/14](#); devices using stimulated emission [H01S](#) ; frequency regulation by comparison with a reference frequency determined by energy levels of molecules, atoms, or subatomic particles [H03L 7/26](#) )

**H05H 1/00****Generating plasma; Handling plasma**

- H05H 1/0006 . { Investigating plasma, e.g. degree of ionisation ( electron temperature ) }
- H05H 1/0012 .. { by using radiation }
- H05H 1/0018 ... { Details }
- H05H 1/0025 ... { by using photoelectric means ( [H05H 1/0031](#) to [H05H 1/0043](#) take precedence ) }
- H05H 1/0031 ... { by interferometry }
- H05H 1/0037 ... { by spectrometry ( see [G01N 3/00](#) ) }
- H05H 1/0043 ... { by using infra-red or ultra-violet radiation }
- H05H 1/005 ... { by using X-rays or alpha rays ( see [G01N 23/00](#) ) }
- H05H 1/0056 ... { by using neutrons ( see [G01N 23/00](#) ) }
- H05H 1/0062 ... { by using microwaves ( see [G01N 23/34](#) ) }
- H05H 1/0068 .. { by thermal means ( see [G01N 25/00](#) ) }
- H05H 1/0075 ... { Langmuir probes }
- H05H 1/0081 .. { by electric means ( see [G01N 27/00](#), [G01R](#) ) }
- H05H 1/0087 .. { by magnetic means ( see [G01N 27/00](#), [G01R](#) ) }
- H05H 1/0093 .. { by acoustic, e.g. ultrasonic means ( see [G01N 29/02](#) ) }
  
- H05H 1/02 . Arrangements for confining plasma by electric or magnetic fields; Arrangements for heating plasma ( { [G21B 1/00](#) takes precedence; } electron optics [H01J](#) )
- H05H 1/03 .. using electrostatic fields
- H05H 1/04 .. using magnetic fields substantially generated by the discharge in the plasma
- H05H 1/06 ... longitudinal pinch devices
- H05H 1/08 ... Theta pinch devices { e.g. SCYLLA }
- H05H 1/10 .. using externally-applied magnetic field only { e.g. Q-machines, Yin-Yang, base-ball }
- H05H 1/105 ... { using magnetic pumping }
- H05H 1/11 ... using cusp configuration ( [H05H 1/14](#) takes precedence )
- H05H 1/12 ... wherein the containment vessel forms a closed or nearly closed loop { [G21B 1/05](#) takes precedence }
- H05H 1/14 ... wherein the containment vessel is straight and has magnetic mirrors { electron

- mirrors [G21K 1/08B](#) }
- H05H 1/16 . . . using externally-applied electric and magnetic field
- H05H 1/18 . . . wherein the field oscillate at very high frequency, e.g. in the microwave range { e.g. using [cyclotron resonance](#) }
- H05H 1/20 . . . Ohmic heating
- H05H 1/22 . . . for injection heating { ( [G21B 1/15](#) takes precedence ) }
- H05H 1/24 . . Generating plasma { ( gas-filled discharge reactors [H01J 37/32](#); nuclear fusion reactors [G21B 1/00](#); ohmic heating [H05H 1/20](#); injection heating [H05H 1/22](#) ) }
- H05H 1/2406 . . { [Dielectric barrier discharges](#) }
- H05H 1/2475 . . { [Acoustic pressure discharge](#) }
- H05H 1/26 . . Plasma torches { ( metal working with constricted arc [B23K 10/00](#), [H05H 10/02](#); metal spraying [B05B 7/18](#), [B05B 7/20](#) ) }
- H05H 1/28 . . . Cooling arrangements
- H05H 1/30 . . . using applied electromagnetic fields, e.g. high frequency or microwave energy ( [H05H 1/28](#) takes precedence )
- H05H 1/32 . . . using an arc ( [H05H 1/28](#) takes precedence )
- H05H 1/34 . . . . Details, e.g. electrodes, nozzles { cf. [B23K 9/24](#) }
- H05H 1/3405 . . . . { [Arc stabilising or constricting arrangements](#), e.g. by an additional gas flow ( by externally applied magnetic field [H05H 1/40](#); by using powders or liquids [H05H 1/42](#); using coaxial protecting fluid [H05H 1/341](#) ) }
- H05H 1/341 . . . . { using coaxial protecting fluid ( arc stabilising or constricting arrangements [H05H 1/3405](#); introducing materials into the plasma [H05H 1/42](#) ) }
- H05H 1/36 . . . . Circuit arrangements ( [H05H 1/38](#) , [H05H 1/40](#) take precedence )
- H05H 1/38 . . . . Guiding or centering of electrodes
- H05H 1/40 . . . . using applied magnetic fields, e.g. for focusing or rotating the arc { cf. [B23K 9/08](#), [B23K 9/06C5](#) }
- H05H 1/42 . . . . with provision for introducing materials into the plasma, e.g. powder, liquid ( electrostatic spraying, spraying apparatus with means for charging the spray electrically [B05B 5/00](#) ) { cf. [B23K 9/324](#), [B05B 7/22](#); arc stabilising or constricting arrangements [H05H 1/3405](#); coaxial protecting fluids [H05H 1/341](#) }
- H05H 1/44 . . . . using more than one torch
- H05H 1/46 . . . using applied electromagnetic fields, e.g. high frequency or microwave energy ( [H05H 1/26](#) takes precedence )
- H05H 1/48 . . . using an arc ( [H05H 1/26](#) takes precedence )
- H05H 1/50 . . . and using applied magnetic fields, e.g. for focusing or rotating the arc
- H05H 1/52 . . . using exploding wires or spark gaps ( [H05H 1/26](#) takes precedence; spark gaps in general [H01T](#) )
- H05H 1/54 . . Plasma accelerators
- H05H 3/00 Production or acceleration of neutral particle beams, e.g. molecular or atomic beams**
- H05H 3/02 . . Molecular or atomic beam generation { ( charge exchange devices [G21K 1/14](#); polarising devices [G21K 1/16](#); using resonance or molecular beams for analysing or investigating materials [G01N 24/002](#); atomic clock [G04F 5/14](#); beam masers

[1/06](#) ) }

H05H 3/04

- Acceleration by electromagnetic wave pressure

H05H 3/06

- Generating neutron beams ( targets for producing nuclear reactions [H05H 6/00](#); neutron sources [G21G 4/02](#) )

**H05H 5/00**

**Direct voltage accelerators; Accelerators using single pulses** ( [H05H 3/06](#) takes precedence )

H05H 5/02

- Details ( targets for producing nuclear reactions [H05H 6/00](#) )

H05H 5/03

- .. Accelerating tubes ( vessels or containers of electric discharge tubes with improved potential distribution over surface of vessel [H01J 5/06](#); shields of X-ray tubes associated with vessels or containers [H01J 35/16](#) )

H05H 5/04

- { energised by electrostatic generators }

H05H 5/042

- .. { of the van de Graaf type }

H05H 5/045

- .. { High voltage cascades, e.g. Greinacher cascade }

H05H 5/047

- .. { Pulsed generators }

H05H 5/06

- { Multistage accelerators }

H05H 5/063

- .. { Tandems }

H05H 5/066

- .. { Onion-like structures }

H05H 5/08

- Particle accelerators using step-up transformers, e.g. resonance transformers

**H05H 6/00**

**Targets for producing nuclear reactions** ( supports for targets or objects to be irradiated [G21K 5/08](#) ) { preparation of tritium [C01B 4/00](#) }; { targets, e.g. pellets for fusion reactions by laser or charged particles beam injection [H05H 1/22](#) }

H05H 6/005

- { Polarised targets ( polarising devices, e.g. for obtaining a polarised ion beam [G21K 1/16](#) ) }

**H05H 7/00**

**Details of devices of the types covered by groups [H05H 9/00](#), [H05H 11/00](#), [H05H 13/00](#)**

H05H 7/001

- { Arrangements for beam delivery or irradiation ( irradiation systems per se [G21K 5/00](#) ) }

H05H 7/02

- Circuits or systems for supplying or feeding radio-frequency energy ( radio-frequency generators [H03B](#) )

H05H 7/04

- Magnet systems { e.g. undulators, wigglers ( free-electron laser [H01S 3/0903](#) ) }; Energisation thereof

H05H 7/06

- Two-beam arrangements; Multi-beam arrangements { storage rings }; Electron rings

H05H 7/08

- Arrangements for injecting particles into orbits

H05H 7/10

- Arrangements for ejecting particles from orbits

- H05H 7/12 . Arrangements for varying final energy of beam
- H05H 7/14 . Vacuum chambers ( [H05H 5/03](#) takes precedence )
- H05H 7/16 . . of the waveguide type
- H05H 7/18 . . Cavities; Resonators { ( travelling-wave tubes [H01J 23/18](#); hyperfrequency cavities in general [H01P 7/04](#), [H01P 7/06](#) ) }
- H05H 7/20 . . . with superconductive walls
- H05H 7/22 . Details of linear accelerators, e.g. drift tubes ( [H05H 7/02](#) to [H05H 7/20](#) take precedence )

**H05H 9/00****Linear accelerators**

- H05H 9/005 . { Dielectric wall accelerators }
- H05H 9/02 . Travelling-wave linear accelerators { travelling-wave tubes [H01J 25/34](#) }
- H05H 9/04 . Standing-wave linear accelerators
- H05H 9/041 . . { Hadron LINACS }
- H05H 9/042 . . . { Drift tube LINACS }
- H05H 9/044 . . . { Coupling cavity LINACS, e.g. side coupled }
- H05H 9/045 . . . { Radio frequency quadrupoles }
- H05H 9/047 . . . { Hybrid systems }
- H05H 9/048 . . { Lepton LINACS }

**H05H 11/00****Magnetic induction accelerators, e.g. betatrons**

- H05H 11/02 . Air-cored betatrons
- H05H 11/04 . Biased betatrons

**H05H 13/00****Magnetic resonance accelerators; Cyclotrons { ( strophotrons, turbine tubes [H01J 25/62](#) ) }**

- H05H 13/005 . { Cyclotrons }
- H05H 13/02 . Synchrocyclotrons, i.e. frequency modulated cyclotrons
- H05H 13/04 . Synchrotrons
- H05H 13/06 . Air-cored magnetic resonance accelerators
- H05H 13/08 . Alternating-gradient magnetic resonance accelerators
- H05H 13/085 . . { Fixed-field alternating gradient accelerators [FFAG] }
- H05H 13/10 . Accelerators comprising one or more linear accelerating sections and bending magnets or the like to return the charged particles in a trajectory parallel to the first accelerating section, e.g. microtrons

**H05H 15/00**

**Methods or devices for acceleration of charged particles not otherwise provided for**

**H05H 2001/00**

**Generating plasma; Handling plasma**

- H05H 2001/24 . Generating plasma { ( gas-filled discharge reactors [H01J 37/32](#); nuclear fusion reactors [G21B 1/00](#); ohmic heating [H05H 1/20](#); injection heating [H05H 1/22](#) ) }
- H05H 2001/2406 .. { Dielectric barrier discharges }
- [H05H 2001/2412](#) ... the dielectric being interposed between the electrodes
- [H05H 2001/2418](#) ... the electrodes being embedded in the dielectric
- [H05H 2001/2425](#) ... the electrodes being flush with the dielectric
- [H05H 2001/2431](#) ... Cylindrical electrodes
- [H05H 2001/2437](#) ... Multilayer systems
- [H05H 2001/2443](#) ... Flow through, i.e. the plasma fluid flowing in a dielectric tube
- [H05H 2001/245](#) .... Internal electrodes
- [H05H 2001/2456](#) .... External electrodes
- [H05H 2001/2462](#) .... Ring electrodes
- [H05H 2001/2468](#) .... Spiral electrodes
- H05H 2001/2475 .. { Acoustic pressure discharge }
- [H05H 2001/2481](#) ... Piezoelectric actuators
- [H05H 2001/2487](#) ... Mechanical actuators
- [H05H 2001/2493](#) ... Horns
- H05H 2001/26 .. Plasma torches { ( metal working with constricted arc [B23K 10/00](#), [H05H 10/02](#); metal spraying [B05B 7/18](#), [B05B 7/20](#) ) }
- [H05H 2001/32](#) ... using an arc ( [H05H 1/28](#) takes precedence )
- [H05H 2001/34](#) .... Details, e.g. electrodes, nozzles { cf. [B23K 9/24](#) }
- [H05H 2001/3415](#) ..... indexing scheme associated with 1/34
- [H05H 2001/3421](#) ..... transferred arc mode
- [H05H 2001/3426](#) ..... pilot arc
- [H05H 2001/3431](#) ..... coaxial cylindrical electrodes
- [H05H 2001/3436](#) ..... hollow cathode with internal coolant flow
- [H05H 2001/3442](#) ..... cathode with inserted tip
- [H05H 2001/3447](#) ..... rod-like cathode
- [H05H 2001/3452](#) ..... supplementary electrodes between cathode and anode, e.g. cascade
- [H05H 2001/3457](#) ..... nozzle protection devices
- [H05H 2001/3463](#) ..... oblique nozzle
- [H05H 2001/3468](#) ..... vortex generator
- [H05H 2001/3473](#) ..... safety means
- [H05H 2001/3478](#) ..... geometrical details
- [H05H 2001/3484](#) ..... convergent/divergent nozzle
- [H05H 2001/3489](#) ..... contact starting
- [H05H 2001/3494](#) ..... discharge parameter control

- H05H 2001/46 . . . using applied electromagnetic fields, e.g. high frequency or microwave energy ( [H05H 1/26](#) takes precedence )
- [H05H 2001/4607](#) . . . Microwave discharges
- [H05H 2001/4615](#) . . . Surface waves
- [H05H 2001/4622](#) . . . Waveguides
- [H05H 2001/463](#) . . . Antennas or applicators
- [H05H 2001/4637](#) . . . Cables
- [H05H 2001/4645](#) . . . Radiofrequency discharges
- [H05H 2001/4652](#) . . . Inductively coupled
- [H05H 2001/466](#) . . . Electrodes
- [H05H 2001/4667](#) . . . Coiled antennas
- [H05H 2001/4675](#) . . . Capacitively coupled
- [H05H 2001/4682](#) . . . Associated power generators, e. G. Circuits, matching networks
- [H05H 2001/469](#) . . . Flow through, i.e the plasma fluid flowing in a non-dielectric vessel
- [H05H 2001/4692](#) . . . dielectric barrier discharge ( [H05H 1/2406](#) takes precedence )
- [H05H 2001/4695](#) . . . Arc discharge
- [H05H 2001/4697](#) . . . Glow discharge
- H05H 2001/48 . . . using an arc ( [H05H 1/26](#) takes precedence )
- [H05H 2001/481](#) . . . Corona discharges
- [H05H 2001/483](#) . . . Pointed electrodes
- [H05H 2001/485](#) . . . Cylindrical electrodes, e.g. Rotary drums electrodes
- [H05H 2001/486](#) . . . Filamentary electrodes
- [H05H 2001/488](#) . . . Segmented electrodes
  
- H05H 2006/00** **Targets for producing nuclear reactions** ( supports for targets or objects to be irradiated [G21K 5/08](#) ) { preparation of tritium [C01B 4/00](#) }; { targets, e.g. pellets for fusion reactions by laser or charged particles beam injection [H05H 1/22](#) }
  
- [H05H 2006/002](#) . Windows
- [H05H 2006/007](#) . Radiation protection arrangements , e.g. screens
  
- H05H 2007/00** **Details of devices of the types covered by groups [H05H 9/00](#), [H05H 11/00](#), [H05H 13/00](#)**
  
- H05H 2007/001 . { Arrangements for beam delivery or irradiation ( irradiation systems per se [G21K 5/00](#) ) }
- [H05H 2007/002](#) . . for modifying beam trajectory , e.g. gantries
- [H05H 2007/004](#) . . for modifying beam energy, e.g. spread out Bragg peak devices
- [H05H 2007/005](#) . . for modifying beam emittance , e.g. stochastic cooling devices, stripper foils
- [H05H 2007/007](#) . . for focusing the beam to irradiation target
- [H05H 2007/008](#) . . for measuring beam parameters
  
- H05H 2007/02 . Circuits or systems for supplying or feeding radio-frequency energy ( radio-frequency generators [H03B](#) )

H05H 2007/022	.. Pulsed systems
H05H 2007/025	.. Radiofrequency systems
H05H 2007/027	.. Microwave systems
H05H 2007/04	. Magnet systems { e.g. undulators, wigglers ( free-electron laser <a href="#">H01S 3/0903</a> ) }; Energisation thereof
H05H 2007/041	.. for beam bunching , e.g. undulators
H05H 2007/043	.. for beam focusing
H05H 2007/045	.. for beam bending
H05H 2007/046	.. for beam deflection
H05H 2007/048	.. for modifying beam trajectory , e.g. gantry systems
H05H 2007/06	. Two-beam arrangements; Multi-beam arrangements { storage rings }; Electron rings
H05H 2007/065	.. Multi-beam merging , e.g. funneling
H05H 2007/08	. Arrangements for injecting particles into orbits
H05H 2007/081	.. Sources
H05H 2007/082	... Ion sources, e.g. ECR, duoplasmatron, PIG, laser sources
H05H 2007/084	... Electron sources
H05H 2007/085	.. by electrostatic means
H05H 2007/087	.. by magnetic means
H05H 2007/088	.. by mechanical means, e.g. stripping foils
H05H 2007/12	. Arrangements for varying final energy of beam
H05H 2007/122	.. by electromagnetic means , e.g. RF cavities
H05H 2007/125	.. by mechanical means , e.g. stripping foils
H05H 2007/127	.. by emittance variation , e.g. stochastic cooling
H05H 2007/22	. Details of linear accelerators, e.g. drift tubes ( <a href="#">H05H 7/02</a> to <a href="#">H05H 7/20</a> take precedence )
H05H 2007/222	.. drift tubes
H05H 2007/225	.. coupled cavities arrangements
H05H 2007/227	.. power coupling , e.g. coupling loops
<b>H05H 2240/00</b>	<b>Test</b>
H05H 2240/10	. at atmospheric pressure
H05H 2240/20	. Non-thermal plasma
<b>H05H 2242/00</b>	<b>Auxiliary systems</b>
H05H 2242/10	. Cooling arrangements
H05H 2242/1005	.. Power supply other than for plasma torches
<b>H05H 2245/00</b>	<b>test</b>

- H05H 2245/104 . spiral electrodes
- H05H 2245/12 . Applications
- H05H 2245/121 . . treatment of exhaust gas, e.g. Ambient air, ozonizers
- H05H 2245/1215 . . . Exhaust gas
- H05H 2245/122 . . medical applications { e.g. plasma scalpels, blades, bistouri }
- H05H 2245/1225 . . . Sterilization of objects
- H05H 2245/123 . . surface treatments
- H05H 2245/1235 . . . coating of large volume items
- H05H 2245/124 . . production of nanostructures
- H05H 2245/125 . . portable devices

### **H05H 2277/00 Applications**

- H05H 2277/10 . Medical devices
- H05H 2277/11 . . Radiotherapy
- H05H 2277/113 . . . Diagnostic systems
- H05H 2277/116 . . . Isotope production
- H05H 2277/12 . Ion implantation
- H05H 2277/13 . High energy applications , e.g. fusion
- H05H 2277/14 . Portable devices
- H05H 2277/1405 . . Detection systems