

**ECLA****EUROPEAN CLASSIFICATION****H05H**

**PLASMA TECHNIQUE** (fusion reactors G21B; ion-beam tubes [H01J27/00](#); magnetohydrodynamic generators [H02K44/08](#); producing X-rays involving plasma generation [H05G2/00](#)); **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 [G04F5/14](#); devices using stimulated emission H01S; frequency regulation by comparison with a reference frequency determined by energy levels of molecules, atoms, or subatomic particles [H03L7/26](#))

**H05H1/00****Generating plasma; Handling plasma**

- H05H1/00A . [N: Investigating plasma, e.g. degree of ionisation (electron temperature)]
- H05H1/00A2 . . [N: by using radiation]
- H05H1/00A2A . . . [N: Details]
- H05H1/00A2B . . . [N: by using photoelectric means ([H05H1/00A2C](#) to [H05H1/00A2E](#) take precedence)]
- H05H1/00A2C . . . [N: by interferrometry]
- H05H1/00A2D . . . [N: by spectrometry (see [G01N3/00](#))]
- H05H1/00A2E . . . [N: by using infra-red or ultra-violet radiation]
- H05H1/00A2F . . . [N: by using X-rays or alpha rays (see [G01N23/00](#))]
- H05H1/00A2G . . . [N: by using neutrons (see [G01N23/00](#))]
- H05H1/00A2H . . . [N: by using microwaves (see [G01N23/34](#))]
- H05H1/00A3 . . [N: by thermal means (see [G01N25/00](#))]
- H05H1/00A3B . . . [N: Langmuir probes]
- H05H1/00A4 . . [N: by electric means (see [G01N27/00](#), [G01R](#))]
- H05H1/00A5 . . [N: by magnetic means (see [G01N27/00](#), [G01R](#))]
- H05H1/00A6 . . [N: by acoustic, e.g. ultrasonic means (see [G01N29/02](#))]
  
- H05H1/02 . Arrangements for confining plasma by electric or magnetic fields; Arrangements for heating plasma ( [N: [G21B1/00](#) takes precedence;] electron optics [H01J](#)) [M1112]
- H05H1/03 . . using electrostatic fields
- H05H1/04 . . using magnetic fields substantially generated by the discharge in the plasma
- H05H1/06 . . . longitudinal pinch devices
- H05H1/08 . . . Theta pinch devices [N: e.g. SCYLLA]
- H05H1/10 . . using externally-applied magnetic field only [N: e.g. Q-machines, Yin-Yang, base-ball]
- H05H1/10B . . . [N: using magnetic pumping]
- H05H1/11 . . . using cusp configuration ([H05H1/14](#) takes precedence)
- H05H1/12 . . . wherein the containment vessel forms a closed or nearly closed loop [N: ([G21B1/05](#) takes precedence)] [M1112]
- H05H1/14 . . . wherein the containment vessel is straight and has magnetic mirrors [N:

- electron mirrors [G21K1/08B](#)]
- H05H1/16 . . . using externally-applied electric and magnetic field
  - H05H1/18 . . . wherein the field oscillate at very high frequency, e.g. in the microwave range  
[N: e.g. using cyclotron resonance]
  - H05H1/20 . . . Ohmic heating
  - H05H1/22 . . . for injection heating [N: ([G21B1/15](#) takes precedence)] [M1112]
  - H05H1/24 . . . Generating plasma [N: (gas-filled discharge reactors [H01J37/32](#); nuclear fusion reactors [G21B1/00](#); ohmic heating [H05H1/20](#); injection heating [H05H1/22](#)) [M1112]
  - H05H1/24A . . . [N: Dielectric barrier discharges] [N1105] [M1115]
  - H05H1/24B . . . [N: Acoustic pressure discharge] [N1112]
  - H05H1/26 . . . Plasma torches [N: (metal working with constricted arc [B23K10/00](#), [H05H10/02](#); metal spraying [B05B7/18](#), [B05B7/20](#))]
  - H05H1/28 . . . . Cooling arrangements
  - H05H1/30 . . . . using applied electromagnetic fields, e.g. high frequency or microwave energy ([H05H1/28](#) takes precedence)
  - H05H1/32 . . . . using an arc ([H05H1/28](#) takes precedence)
  - H05H1/34 . . . . . Details, e.g. electrodes, nozzles [N: cf. [B23K9/24](#)]
  - H05H1/34E . . . . . [N: Arc stabilising or constricting arrangements, e.g. by an additional gas flow (by externally applied magnetic field [H05H1/40](#); by using powders or liquids [H05H1/42](#); using coaxial protecting fluid [H05H1/34G](#))]
  - H05H1/34G . . . . . [N: using coaxial protecting fluid (arc stabilising or constricting arrangements [H05H1/34E](#); introducing materials into the plasma [H05H1/42](#))]
  - H05H1/36 . . . . . Circuit arrangements ([H05H1/38](#), [H05H1/40](#) take precedence)
  - H05H1/38 . . . . . Guiding or centering of electrodes
  - H05H1/40 . . . . . using applied magnetic fields, e.g. for focusing or rotating the arc [N: cf. [B23K9/08](#), [B23K9/06C5](#)]
  - H05H1/42 . . . . . with provision for introducing materials into the plasma, e.g. powder, liquid (electrostatic spraying, spraying apparatus with means for charging the spray electrically [B05B5/00](#)) [N: cf. [B23K9/32E](#), [B05B7/22](#); arc stabilising or constricting arrangements [H05H1/34E](#); coaxial protecting fluids [H05H1/34G](#)]
  - H05H1/44 . . . . . using more than one torch
  - H05H1/46 . . . using applied electromagnetic fields, e.g. high frequency or microwave energy ([H05H1/26](#) takes precedence)
  - H05H1/48 . . . using an arc ([H05H1/26](#) takes precedence)
  - H05H1/50 . . . . and using applied magnetic fields, e.g. for focusing or rotating the arc
  - H05H1/52 . . . using exploding wires or spark gaps ([H05H1/26](#) takes precedence; spark gaps in general [H01T](#))
  - H05H1/54 . . . Plasma accelerators
  - H05H3/00** **Production or acceleration of neutral particle beams, e.g. molecular or atomic beams**
  - H05H3/02 . . . Molecular or atomic beam generation [N: (charge exchange devices [G21K1/14](#); polarising devices [G21K1/16](#); using resonance or molecular beams for analysing or investigating materials [G01N24/00B](#); atomic clock [G04F5/14](#); beam masers [H01S1/06](#))]

- H05H3/04 . Acceleration by electromagnetic wave pressure
- H05H3/06 . Generating neutron beams (targets for producing nuclear reactions [H05H6/00](#); neutron sources [G21G4/02](#))
- H05H5/00** **Direct voltage accelerators; Accelerators using single pulses** ([H05H3/06](#) takes precedence)
- H05H5/02 . Details (targets for producing nuclear reactions [H05H6/00](#))
- H05H5/03 . . Accelerating tubes (vessels or containers of electric discharge tubes with improved potential distribution over surface of vessel [H01J5/06](#); shields of X-ray tubes associated with vessels or containers [H01J35/16](#))
- H05H5/04 . [N: energised by electrostatic generators] [M1112]
- H05H5/04A . . [N: of the van de Graaf type] [N1112]
- H05H5/04B . . [N: High voltage cascades, e.g. Greinacher cascade] [N1112]
- H05H5/04C . . [N: Pulsed generators] [N1112]
- H05H5/06 . [N: Multistage accelerators] [M1112]
- H05H5/06A . . [N: Tandems] [N1112]
- H05H5/06B . . [N: Onion-like structures] [N1112]
- H05H5/08 . Particle accelerators using step-up transformers, e.g. resonance transformers
- H05H6/00** **Targets for producing nuclear reactions** (supports for targets or objects to be irradiated [G21K5/08](#)) [N: preparation of tritium [C01B4/00](#)]; [N: targets, e.g. pellets for fusion reactions by laser or charged particles beam injection [H05H1/22](#)]
- H05H6/00B . [N: Polarised targets (polarising devices, e.g. for obtaining a polarised ion beam [G21K1/16](#))]
- H05H7/00** **Details of devices of the types covered by groups [H05H9/00](#), [H05H11/00](#), [H05H13/00](#) [M1112]**
- H05H7/00A . [N: Arrangements for beam delivery or irradiation (irradiation systems per se [G21K5/00](#))] [N1112]
- H05H7/02 . Circuits or systems for supplying or feeding radio-frequency energy (radio-frequency generators [H03B](#))
- H05H7/04 . Magnet systems [N: e.g. undulators, wigglers (free-electron laser [H01S3/09B](#))]; Energisation thereof
- H05H7/06 . Two-beam arrangements; Multi-beam arrangements [N: storage rings]; Electron rings
- H05H7/08 . Arrangements for injecting particles into orbits
- H05H7/10 . Arrangements for ejecting particles from orbits
- H05H7/12 . Arrangements for varying final energy of beam

- H05H7/14 . Vacuum chambers ([H05H5/03](#) takes precedence)
- H05H7/16 . . of the waveguide type
- H05H7/18 . . Cavities; Resonators [N: (travelling-wave tubes [H01J23/18](#); hyperfrequency cavities in general [H01P7/04](#), [H01P7/06](#))]
- H05H7/20 . . . with superconductive walls
- H05H7/22 . Details of linear accelerators, e.g. drift tubes ([H05H7/02](#) to [H05H7/20](#) take precedence)

## **H05H9/00 Linear accelerators [M1112]**

- H05H9/00A . [N: Dielectric wall accelerators] [N1112]
- H05H9/02 . Travelling-wave linear accelerators [N: travelling-wave tubes [H01J25/34](#)]
- H05H9/04 . Standing-wave linear accelerators
- H05H9/04A . . [N: Hadron LINACS] [N1112]
- H05H9/04A1 . . . [N: Drift tube LINACS] [N1112]
- H05H9/04A2 . . . [N: Coupling cavity LINACS, e.g. side coupled] [N1112]
- H05H9/04A3 . . . [N: Radio frequency quadrupoles] [N1112]
- H05H9/04A4 . . . [N: Hybrid systems] [N1112]
- H05H9/04B . . [N: Lepton LINACS] [N1112]

## **H05H11/00 Magnetic induction accelerators, e.g. betatrons**

- H05H11/02 . Air-cored betatrons
- H05H11/04 . Biased betatrons

## **H05H13/00 Magnetic resonance accelerators; Cyclotrons [N: (strophotrons, turbine tubes [H01J25/62](#))]**

- H05H13/00A . [N: Cyclotrons] [N1112]
- H05H13/02 . Synchrocyclotrons, i.e. frequency modulated cyclotrons
- H05H13/04 . Synchrotrons
- H05H13/06 . Air-cored magnetic resonance accelerators
- H05H13/08 . Alternating-gradient magnetic resonance accelerators
- H05H13/08A . . [N: Fixed-field alternating gradient accelerators [FFAG]] [N1112]
- H05H13/10 . 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

## **H05H15/00 Methods or devices for acceleration of charged particles not otherwise provided**

**or**