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)

Definition statement

This subclass/group covers:

Systems and methods for handling plasma, i.e.:

Generating plasma;

Confining plasma.

These systems are essentially related to experimental plasma systems used for studying the conditions for a controlled thermonuclear fusion.

Methods for investigating plasma, i.e. for measuring plasma parameters;

Systems and methods for generating local plasma to be used in industrial applications, e.g. plasma torches for cutting, welding, spraying or incinerating;

Systems and methods for generating and/or accelerating neutral particle beams, i.e. atomic or molecular beams, neutron beams;

Targets for producing nuclear reactions under irradiation;

Systems and methods for accelerating charged particle beams, i.e electrostatic accelerators, linear accelerators, magnetic induction accelerators, magnetic resonance accelerators.

References relevant to classification in this subclass

This subclass/group does not cover:

Nuclear fusion reactors	G21B 1/00
Ion beam tubes	H01J 27/00
Gas-filled discharge tubes for surface	H01J 37/32

treatments	
Mass spectrometers	H01J 49/00
Producing X-rays involving plasma generation	H05G 2/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Atomic clocks	G04F 5/14
Obtaining neutrons from radioactive sources	G21
Radioactive neutron sources	G21G 4/02
Techniques for handling particles or ionising radiation not otherwise provided for; Irradiation devices; Gamma ray or X-ray microscopes	G21K
Lasers	H01S
Magnetohydrodynamic generators	H02K 44/08
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

Definition statement

This subclass/group covers:

- Methods for investigating plasma, i.e. for measuring plasma parameters;

- Systems and methods for confining a plasma by electric, magnetic or electromagnetic means;
- Systems and methods for heating and sustaining a plasma, in particular for performing nuclear fusion reactions, at laboratory scale;
- Systems and methods for generating plasma for industrial applications.

References relevant to classification in this group

This subclass/group does not cover:

Nuclear fusion reactors	G21B
Discharge vessels for exposing objects to the discharge	H01J 37/32

H05H 1/0006

[N: Investigating plasma, e.g. degree of ionisation (electron temperature)]

Definition statement

This subclass/group covers:

Methods for measuring different parameters inherently associated with plasma, by using radiation, thermal, electric, magnetic or acoustic means.

References relevant to classification in this group

This subclass/group does not cover:

Measuring the arc parameters in a plasma arc torch	H05H 1/34, H05H 1/36

H05H 1/0025

[N: by using photoelectric means (H05H1/0031 to H05H1/0043 take precedence)]

References relevant to classification in this group

This subclass/group does not cover:

Investigating by interferrometry	H05H 1/0031

Investigating by spectrometry	H05H 1/0037
Investigating by using infra-red or ultra-violet radiation	H05H 1/0043

H05H 1/0037

[N: by spectrometry (see G01N3/00)]

References relevant to classification in this group

This subclass/group does not cover:

Mass spectrometry	H01J 49/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Investigating strength properties of solid materials by application of mechanical stress	G01N 3/00

H05H 1/005

[N: by using X-rays or alpha rays (see G01N23/00)

References relevant to classification in this group

This subclass/group does not cover:

Investigating materials by particle radiation	G01N 23/00

H05H 1/0056

[N: by using neutrons (see G01N23/00)]

References relevant to classification in this group

This subclass/group does not cover:

Investigating materials by neutron radiation	G01N 23/00

H05H 1/0062

[N: by using microwaves (see G01N23/02)]

References relevant to classification in this group

This subclass/group does not cover:

Investigating materials by use of microwaves	G01N 22/00

H05H 1/0068

[N: by thermal means (see G01N25/00)]

References relevant to classification in this group

This subclass/group does not cover:

Investigating materials by use of thermal means	G01N 25/00

H05H 1/0081

[N: by electric means (see G01N27/00, G01R)]

References relevant to classification in this group

This subclass/group does not cover:

Investigating materials by use of electric means	G01N 27/00

H05H 1/0087

[N: by magnetic means (see G01N27/00 , G01R)]

References relevant to classification in this group

This subclass/group does not cover:

Investigating materials by use of magnetic means	G01N 27/00

H05H 1/0093

[N: by acoustic, e.g. ultrasonic means (see G01N29/02)]

References relevant to classification in this group

This subclass/group does not cover:

Investigating materials by use of ultrasonic waves	G01N 29/00

H05H 1/02

Arrangements for confining plasma by electric and/or magnetic fields; Arrangements for heating a plasma. ([N: G21B1/00 takes precedence;] electron optics H01J)

Definition statement

This subclass/group covers:

Systems and methods for confining a plasma; systems and methods for heating and sustaining the confined plasma.

References relevant to classification in this group

This subclass/group does not cover:

Closed discharge vessels for plasma treatment of objects exposed to the discharge	H01J 37/32

H05H 1/11

using cusp configuration (H05H1/14 takes precedence)

Informative references

Attention is drawn to the following places, which may be of interest for search:

Plasma containment vessels with	H05H 1/14

magnetic mirrors	

H05H 1/12

wherein the containment vessel forms a closed (or nearly closed) loop [N: (G21B1/05 takes precedence)]

Definition statement

This subclass/group covers:

Laboratory systems in which plasma is confined in closed toroidal or helical loops by externally applied magnetic fields.

Relationship between large subject matter areas

Nuclear fusion reactors (operated as prototypes for industrial energy production) based on closed-loop plasma containment systems are classified in G21B.

References relevant to classification in this group

This subclass/group does not cover:

Field Reversed Confinement nuclear reactors	G21B 1/052
Stellarator nuclear reactors	G21B 1/055
Tokamak nuclear reactors	G21B 1/057

H05H 1/14

wherein the containment vessel is straight and has magnetic mirrors [N: electron mirrors G21K1/093]

References relevant to classification in this group

This subclass/group does not cover:

Electron mirrors	G21K 1/08

H05H 1/16

using externally-applied electric and magnetic field

Definition statement

This subclass/group covers:

Laboratory systems in which plasma is generated and confined by application of external magnetic fields and electric fields.

References relevant to classification in this group

This subclass/group does not cover:

Discharge vessels in which objects are exposed to the discharge	H01J 37/32

H05H 1/18

wherein the field oscillate at very high frequency, e.g. in the microwave range, e.g. using cyclotron resonance [N: e.g. using cyclotron resonance]

Definition statement

This subclass/group covers:

Laboratory systems in which plasma is generated and confined by application of external electromagnetic fields at RF or microwave frequency, often operated in condition of electron-cyclotron resonance or ion-cyclotron resonance.

References relevant to classification in this group

This subclass/group does not cover:

Discharge vessels operated at RF or microwave frequency, in which objects are exposed to the discharge	H01J 37/32009

H05H 1/20

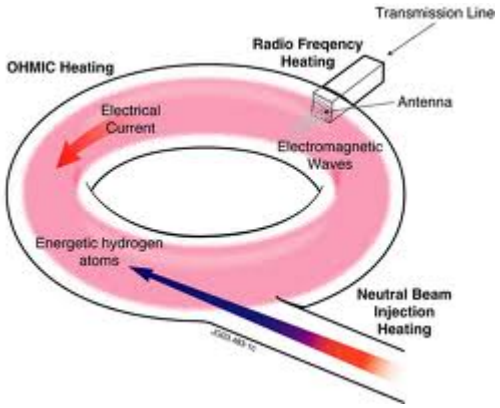
Ohmic heating

Definition statement

This subclass/group covers:

Laboratory systems in which the plasma is heated by inducing a current

through it. The current is induced by an electromagnetic winding linked with the plasma torus, i.e. the plasma acts as the secondary winding of a transformer.



References relevant to classification in this group

This subclass/group does not cover:

Nuclear fusion reactors	G21B 1/05

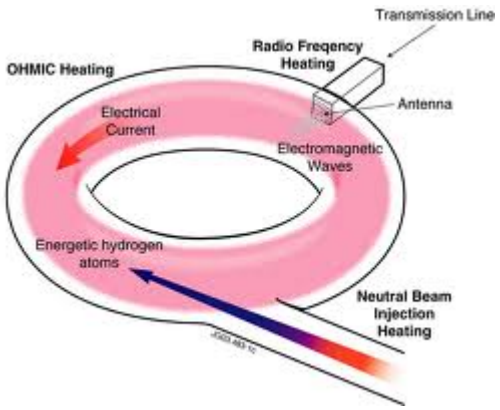
H05H 1/22

for injection heating, e.g. neutral beam injection [N: (G21B1/15 takes precedence)]

Definition statement

This subclass/group covers:

Laboratory systems in which high-energy atoms are injected into the ohmically heated, magnetically confined plasma. The atoms are ionized as they pass through the plasma and are trapped by the magnetic field. The high-energy ions then transfer part of their energy to the plasma particles in repeated collisions, increasing the plasma temperature.



References relevant to classification in this group

This subclass/group does not cover:

Nuclear fusion reactors	G21B 1/05

H05H 1/24

Generating plasma [N: (gas-filled discharge reactors H01J37/32; nuclear fusion reactors G21B1/00; ohmic heating H05H1/20; injection heating H05H1/22)]

Definition statement

This subclass/group covers:

Arrangements for generating plasma to be used in industrial applications, i.e.

- Plasma torches for cutting, welding, surface treatments or spectrometry;
- Plasma systems, other than torches, for treatment of objects or incineration;
- Devices using a plasma discharge for specific applications, e.g. spark gaps, plasma guns;
- Microplasma systems;
- Plasma acceleration systems;
- Power supply systems for the arrangements covered by this group.

Relationship between large subject matter areas

Thermonuclear plasma generating and confining systems for use in nuclear fusion reactor plants are dealt with in G21B 1/00. Plasma generating and confining systems for laboratory nuclear fusion studies are dealt with in H05H 1/00 to H05H 1/22. H01J 49/00 covers the particle spectrometer or separator tubes. H05H 1/24 covers the plasma generation and therefore includes the torches used to generate a plasma from a gas. In gas spectrometry, a gas is normally turned into plasma and the electromagnetic emission is analysed. The torches used to turn such gas into plasma are generally classified in the lower subgroup H05H 1/30, because they use an electromagnetic field to activate the plasma gas.

References relevant to classification in this group

This subclass/group does not cover:

Nuclear fusion reactors	G21B 1/00
Ohmic heating	H05H 1/20
Injection heating	H05H 1/22
Gas-filled discharge tubes for surface treatments	H01J 37/32

H05H 1/2406

[N: Dielectric barrier discharges]

Definition statement

This subclass/group covers:

Arrangements for generating plasma using dielectric-barrier discharges, i.e. a dielectric is interposed between the plasma generating electrodes.

References relevant to classification in this group

This subclass/group does not cover:

Dielectric-barrier discharges in gas-filled discharge tubes	H01J 37/32

H05H 1/2475

[N: Acoustic pressure discharge]

Definition statement

This subclass/group covers:

Arrangements for generating local plasma by application of pressure waves to a gas or liquid-filled medium, i.e. cavitation, sonoluminescence.

References relevant to classification in this group

This subclass/group does not cover:

Plasma generated by shock-waves	H05H 1/52

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Cavitation	Collapse of gas bubbles trapped in a liquid medium
Sonoluminescence	Emission of light by compression and collapse of gas bubbles in a liquid medium

H05H 1/26

Plasma torches [N: (metal working with constricted arc B23K10/00; metal spraying B05B7/18, B05B7/20)]

Definition statement

This subclass/group covers:

This group covers :

Plasma torches, whereby a plasma torch is meant as a device for generating a directed flow of plasma, e.g. used for cutting or welding metals, for localized surface treatment of objects or spectroscopic analysis. In particular, this group covers:

- Torches in which plasma is generated by applied electromagnetic fields, e.g. torches for spectrometry;
- Torches in which plasma is generated by establishment of an arc, e.g. non-transferred arc, transferred arc or both.

Relationship between large subject matter areas

Systems for metal working which include a plasma generating torch are dealt with in B23K 9/00 and B23K 10/00.

References relevant to classification in this group

This subclass/group does not cover:

Devices external to, and connected to, the plasma generating torch.	B23K 10/00
Generation of plasma by RF or microwaves	H05H 1/46

Generation of plasma in a gas-filled tube	H01J 37/32

Informative references

Attention is drawn to the following places, which may be of interest for search:

Metal spraying	B05B 7/18, B05B 7/20
Metal working with constricted arc	B23K 10/00

H05H 1/28

Cooling arrangements

Definition statement

This subclass/group covers:

Arrangements within a plasma torch for cooling the components of the torch and evacuating the heat produced during the torch service.

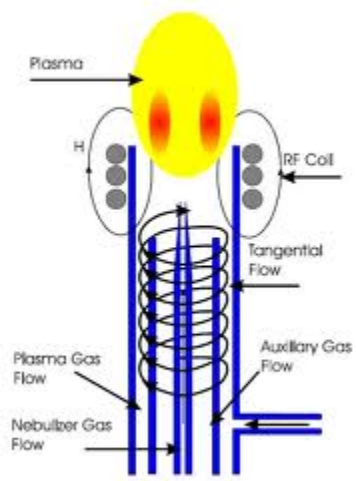
H05H 1/30

using applied electromagnetic fields, e.g. high frequency or microwave energy (H05H1/28 takes precedence)

Definition statement

This subclass/group covers:

Torches in which plasma is generated by high-frequency electromagnetic fields (e.g. inductive coils enveloping the torch), in particular used for spectroscopic analysis.



References relevant to classification in this group

This subclass/group does not cover:

Cooling arrangements	H05H 1/28
Arrangements for arc stabilization by means of externally applied magnetic fields	H05H 1/40

Informative references

Attention is drawn to the following places, which may be of interest for search:

Mass spectrometry	H01J 49/00

H05H 1/32

using an arc (H05H1/28 takes precedence)

Definition statement

This subclass/group covers:

Torches in which plasma is generated by establishing an arc discharge between two electrodes.

References relevant to classification in this group

This subclass/group does not cover:

Devices external to, and connected	B23K 10/00

to, the plasma generating torch	
Generation of plasma by RF or microwaves	H05H 1/46
Generation of plasma in a gas-filled tube	H01J 37/32

Informative references

Attention is drawn to the following places, which may be of interest for search:

Metal spraying	B05B 7/00

H05H 1/34

Details, e.g. electrodes, nozzles [N: cf. B23K9/24]

Definition statement

This subclass/group covers:

Details related to the electrical and mechanical components of a plasma arc torch.

References relevant to classification in this group

This subclass/group does not cover:

Features related to welding or cutting electrodes	B23K 9/24
Circuits for supplying power to the torch	H05H 1/36

H05H 1/3405

[N: Arc stabilising or constricting arrangements, e.g. by an additional gas flow (by externally applied magnetic fieldH05H1/40; by using powders or liquidsH05H1/42; using coaxial protecting fluidH05H1/341)]

Definition statement

This subclass/group covers:

Arrangements for controlling the discharge generating arc, e.g. shaped nozzles, secondary gas circuits.

References relevant to classification in this group

This subclass/group does not cover:

Arrangements providing protecting fluids coaxial with the plasma jet	H05H 1/341
Arrangements for arc stabilization by means of externally applied magnetic fields	H05H 1/40

H05H 1/341

[N: using coaxial protecting fluid (arc stabilising or constricting arrangementsH05H1/3405; introducing materials into the plasmaH05H1/42)]

Definition statement

This subclass/group covers:

Arrangements for protecting the plasma jet exiting from the torch, e.g. from mixing with and/or cooling by the surrounding atmosphere.

References relevant to classification in this group

This subclass/group does not cover:

Arrangements for controlling the plasma jet	H05H 1/3405

H05H 1/36

Circuit arrangements (H05H1/38, H05H1/40 take precedence)

Definition statement

This subclass/group covers:

Circuits arrangements for supplying electric power to the torch, and arrangements for supplying gases to the torch.

Relationship between large subject matter areas

The arc welding or cutting systems, in which a plasma arc torch is inserted, are dealt with in B23K 10/00 and B23K 9/00.

References relevant to classification in this group

This subclass/group does not cover:

Guiding or centering of electrodes	H05H 1/38
Applied magnetic fields, e.g. for fucusing or rotating the arc	H05H 1/40
Circuits for arc welding systems	B23K 9/09, B23K 9/10

H05H 1/38

Guiding or centering of electrodes

Definition statement

This subclass/group covers:

Systems for guiding consumable electrodes in the torch.

References relevant to classification in this group

This subclass/group does not cover:

Automatic systems for feeding consumable electrodes to the torch	B23K 9/12

H05H 1/40

using applied magnetic fields, e.g. for fucusing or rotating the arc [N: cf. B23K9/08 , B23K9/073]

Definition statement

This subclass/group covers:

Arrangements for controlling the discharge generating arc with magnetic means.

References relevant to classification in this group

This subclass/group does not cover:

Circuits for magnetic control of the arc in arc welding systems	B23K 9/08, B23K 9/0737
Arrangements for controlling the discharge generating arc with mechanical means	H05H 1/3405

H05H 1/42

with provision for introducing materials into the plasma, e.g. powders or liquid (electrostatic spraying, spraying apparatus with means for charging the spray electrically B05B5/00) [N: cf. B23K9/324, B05B7/22; arc stabilising or constricting arrangements H05H1/3405; coaxial protecting fluids H05H1/341]

Definition statement

This subclass/group covers:

Torches provided with arrangements for introducing materials into the plasma, e.g. precursors for material treatment, either within the torch or at the torch plasma jet exit.

References relevant to classification in this group

This subclass/group does not cover:

Electrostatic spraying apparatuses	B05B 5/00
Devices for supplying a welding powder	B23K 9/324

H05H 1/46

using applied electromagnetic fields, e.g. high frequency or microwave energy (H05H1/26 takes precedence)

Definition statement

This subclass/group covers:

- Plasma systems, other than torches, for treatment of objects, wherein plasma is generated by applied electromagnetic fields, e.g.

microwaves, radiofrequency;

- Microplasma systems.

Relationship between large subject matter areas

Discharge tubes or vessels for plasma treatment of objects under controlled pressure are dealt with in H01J 37/32.

References relevant to classification in this group

This subclass/group does not cover:

Plasma torches	H05H 1/26
Plasma devices using an arc	H05H 1/48
Dielectric barrier discharge devices	H05H 1/2406

Informative references

Attention is drawn to the following places, which may be of interest for search:

Discharge tubes with provision for introducing objects or material to be exposed to the discharge	H01J 37/32

H05H 1/48

using an arc (H05H1/26 takes precedence)

Definition statement

This subclass/group covers:

Plasma systems, other than torches, for treatment of objects, wherein plasma is generated by establishment of an arc, e.g. incinerators.

References relevant to classification in this group

This subclass/group does not cover:

Plasma torches	H05H 1/26
Systems with plasma generated by EM fields	H05H 1/46

H05H 2001/481

corona discharges

Definition statement

This subclass/group covers:

Plasma systems, other than torches, for treatment of object surfaces, wherein plasma is generated by a corona discharge (i.e. the discharge occurs when the strength of the electric field around the electrode is high enough to form a conductive region, but not high enough to cause electrical breakdown or arcing to the object).

References relevant to classification in this group

This subclass/group does not cover:

Dielectric barrier discharge devices	H05H 1/2406

H05H 1/50

and using applied magnetic fields, e.g. for focusing or rotating the arc

References relevant to classification in this group

This subclass/group does not cover:

Torches where plasma is generated by applied EM fields	H05H 1/30
Controlling the arc by EM fields	H05H 1/40

H05H 1/52

using exploding wires or spark gaps (H05H1/26 takes precedence; spark gaps in general H01T)

Definition statement

This subclass/group covers:

Systems using local plasma generation for specific applications.

References relevant to classification in this group

This subclass/group does not cover:

Plasma torches	H05H 1/26

Informative references

Attention is drawn to the following places, which may be of interest for search:

Spark gaps in general	H01T 1/00

H05H 1/54

Plasma accelerators

Definition statement

This subclass/group covers:
System and methods for accelerating ions and/or electrons out of a plasma.

References relevant to classification in this group

This subclass/group does not cover:

Ion thrusters	F03H 1/00
Electron sources for spectroscopy	H01J 49/08
Ion sources for spectroscopy	H01J 49/10
Ion sources for ion beam tubes	H01J 27/02

H05H 3/00

Production or acceleration of neutral particle beams and generation of electromagnetic radiation

Definition statement

This subclass/group covers:
Systems and methods for generating atomic beams, molecular beams and

neutron beams, as well as systems and methods for generating electromagnetic radiation.

References relevant to classification in this group

This subclass/group does not cover:

X-ray or gamma detectors	G01T 1/00
Neutron detectors	G01T 3/00
Manipulation of neutral molecules by optical means	G02B 21/32
Irradiation devices	G21K 5/00
Charge exchange devices	G21K 1/14

H05H 3/02

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 G01N24/002; atomic clock G04F5/14; beam masers H01S1/06)]

Definition statement

This subclass/group covers:

Systems and methods for generating a beam of molecular or atomic particles, e.g. by irradiation of a target or by neutralization of charged particles.

References relevant to classification in this group

This subclass/group does not cover:

Molecular beams for analysing or investigating materials	G01N 24/002
Optical traps	G02B 21/32
Atomic clocks	G04F 5/14
Charge exchange devices	G21K 1/14
Polarising devices	G21K 1/16

Cathodic sputtering	H01J 37/34
Beam masers	H01S 1/06
Neutron generation	H05H 3/06

H05H 3/04

Acceleration by electromagnetic wave pressure

Definition statement

This subclass/group covers:

Systems and methods for accelerating electrically neutral particules by means of electromagnetic fields (e.g. by exploiting their dipolar electric moment, levitation devices) and for accelerating or cooling atom beams (e.g. atom traps, atom chips).

References relevant to classification in this group

This subclass/group does not cover:

Use of photons for propulsive thrust	F03H 3/00
Manipulation of neutral molecules by optical means	G02B 21/32
Handling charged particles	G21K 1/00

H05H 3/06

Generating neutron beams (targets for producing nuclear reactions H05H6/00; neutron sources G21G4/02)

Definition statement

This subclass/group covers:

Systems and methods for generating neutron beams, e.g. by impacting a target in a sealed envelope, by collision of particle beams, for logging tools, for material detection).

References relevant to classification in this group

This subclass/group does not cover:

Targets for producing nuclear reactions	H05H 6/00
Radioactive neutron sources	G21G 4/02
Neutron generation in fission nuclear reactors	G21C
Neutron generation by low-temperature nuclear fusion	G21B 3/00
Neutron prospection and detection	G01V 5/00, G01V 5/10
Radiation detectors	G01T

H05H 5/00

Direct voltage accelerators; Accelerators using single pulses (H05H3/06 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Generating neutron beams	H05H 3/06

H05H 5/02

Details (targets for producing nuclear reactions H05H6/00)

References relevant to classification in this group

This subclass/group does not cover:

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 H01J5/06; shields of X-ray tubes associated with vessels or containers H01J35/16)

References relevant to classification in this group

This subclass/group does not cover:

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 5/045

[N: High voltage cascades, e.g. Greinacher cascade]

Definition statement

This subclass/group covers:

Electrostatic generators provided with high-voltage cascades, e.g. Greinacher cascade.

H05H 6/00

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]

Definition statement

This subclass/group covers:

Materials and devices used as a target for producing secondary particles upon impact of an impinging beam.

This subclass includes also auxiliary components of the targets, such as windows, radiation protective screens, cooling arrangements.

References relevant to classification in this group

This subclass/group does not cover:

Systems for treating objects by irradiation	G21K 5/00

Supports for objects to be irradiated	G21K 5/08
Pellets for fusion reactions	G21B 1/19
Arrangements for converting chemical elements by target irradiation	G21G 1/00
Recovery of isotopes from an irradiated target	G21G 1/00

H05H 6/005

[N: Polarised targets (polarising devices, e.g. for obtaining a polarised ion beam G21K1/16)]

Definition statement

This subclass/group covers:

Polarised targets used in quantum physics (e.g., targets for polarising neutron beams, spin-polarised thermonuclear fuels) and arrangements for their production.

References relevant to classification in this group

This subclass/group does not cover:

Manipulation of particles by means of polarising devices	G21K 1/16

H05H 7/00

Details of devices of the types covered by groups H05H9/00 , H05H11/00, H05H13/00

Definition statement

This subclass/group covers:

Constructive arrangements and components of linear accelerators, magnetic induction accelerators and magnetic resonance accelerators (e.g. magnet systems, power supply systems), their auxiliary systems (e.g. beam injection systems, undulators) and irradiation systems using such accelerators.

References relevant to classification in this group

This subclass/group does not cover:

Irradiation of objects	G21K 5/00
Direct voltage accelerators	H05H 5/00

Synonyms and Keywords

In patent documents the following expressions/words are often used as synonyms:

"LINAC" and "Linear accelerator"

"CW" and "Continuous wave"

H05H 7/001

[N: Arrangements for beam delivery or irradiation (irradiation systems per se G21K5/00)]

Definition statement

This subclass/group covers:

Systems for delivering the accelerated beam of particles to the target.

References relevant to classification in this group

This subclass/group does not cover:

Gantries for radiation therapy	A61N 5/00
Radiation diagnosis	A61B 6/00
Product irradiation systems	G21K 5/00

H05H 7/02

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

Definition statement

This subclass/group covers:

Systems for supplying microwave or radio-frequency energy to the different components and auxiliaries of the accelerator, e.g. accelerating cavities,

electromagnets, particle sources.

References relevant to classification in this group

This subclass/group does not cover:

Radio-frequency generators	H03B
Klystrons	H03B 9/04

H05H 7/04

Magnet systems [N: e.g. undulators, wigglers (free-electron laser H01S3/0903)]; Energisation thereof

Definition statement

This subclass/group covers:

All kind of magnets and superconducting magnets used in particle accelerators, e.g. for beam bunching (undulators, wigglers), focusing, bending or deflecting.

References relevant to classification in this group

This subclass/group does not cover:

Free-electron lasers	H01S 3/0903

Informative references

Attention is drawn to the following places, which may be of interest for search:

Magnets in general	H01F

H05H 7/06

Two-beam arrangements; Multi-beam arrangements [N: storage rings]; Electron rings

Definition statement

This subclass/group covers:

Arrangements for storing and accelerating plural particle beams at the same

time (e.g. for beam collision purposes) and for beam merging (e.g. funneling).

References relevant to classification in this group

This subclass/group does not cover:

Beam collisioners for nuclear fusion	G21B 3/006

H05H 7/08

Arrangements for injecting particles into orbits

Definition statement

This subclass/group covers:

Systems and methods for forming and injecting particle beams into an accelerator by mechanical, electrostatic or magnetic means (e.g. ion and electron sources, pre-accelerators).

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

ECR	Electron Cyclotron Resonance
PIG	Cathodic source of light ions
EBIS	Electron-Beam Ion Source
CSD	Charge State Distribution

H05H 7/10

Arrangements for ejecting particles from orbits

Definition statement

This subclass/group covers:

Arrangements for extracting the charged particles from the accelerators, e.g. septa, stripping foils.

References relevant to classification in this group

This subclass/group does not cover:

Arrangements for modifying the trajectory of the extracted beam (gantries)	A61K

H05H 7/12

Arrangements for varying final energy of beam

Definition statement

This subclass/group covers:

Systems and methods for varying the energy of the extracted beam, by electromagnetic or mechanical means or by emittance variation (e.g. RF cavities, stripping foils, stochastic cooling).

H05H 7/14

Vacuum chambers (H05H5/03 takes precedence)

Definition statement

This subclass/group covers:

The vacuum chambers, cavities and resonators used in a charged particle accelerator and their auxiliary systems (e.g. vacuum pumps, cryostats).

References relevant to classification in this group

This subclass/group does not cover:

Accelerating tubes for direct-voltage accelerators	H05H 5/03

H05H 7/18

Cavities; Resonators [N: (travelling-wave tubes H01J23/18; hyperfrequency cavities in general H01P7/04, H01P7/06)]

References relevant to classification in this group

This subclass/group does not cover:

Travelling-wave tubes	H01J 23/18

Informative references

Attention is drawn to the following places, which may be of interest for search:

Hyper-frequency cavities in general	H01P 7/04 , H01P 7/06

H05H 7/22

Details of linear accelerators (H05H7/02 to H05H7/20 take precedence)

Definition statement

This subclass/group covers:

Specific components and systems of linear accelerators (e.g. drift tubes, arrangements for coupling cavities, arrangements for coupling power to cavities) and of the accelerators covered by H05H 15/00.

References relevant to classification in this group

This subclass/group does not cover:

Details of the accelerators covered by H05H 9/00 to H05H 13/10	H05H 7/00
Other details	H05H 7/02 - H05H 7/20

Informative references

Attention is drawn to the following places, which may be of interest for search:

RF supplying systems	H05H 7/02

H05H 9/00

Linear accelerators

Definition statement

This subclass/group covers:

Hadron linacs, drift-tube linacs, side-coupled cavity linacs, RF quadrupoles, lepton linacs and hybrid linacs.

References relevant to classification in this group

This subclass/group does not cover:

Gantries for radiotherapy	A61N 5/00
DC linear accelerators	H05H 5/00

H05H 9/02

Travelling-wave linear accelerators [N: travelling-wave tubes H01J25/34]

Definition statement

This subclass/group covers:

Systems and methods for accelerating electron beams by means of an electromagnetic wave (microwave) travelling in a tube serving as waveguide.

References relevant to classification in this group

This subclass/group does not cover:

Travelling-wave tubes	H01J 25/34

H05H 9/04

Standing-wave linear accelerators

Definition statement

This subclass/group covers:

Linear accelerators wherein electric fields are set up as standing waves within a resonant cavity, with drift tubes suspended along the central axis.

Linear accelerators for hadron particles, e.g. protons, neutrons and ions.

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

HADRON	composite particle subject to strong interaction

LINAC	Linear Accelerator

H05H 9/042

[N: Drift-tube Linacs]

Definition statement

This subclass/group covers:
Linear accelerators with drift tubes suspended along the central axis.

H05H 9/047

[N: Hybrid systems]

Definition statement

This subclass/group covers:
Linear accelerators combining the features of H05H 9/042 to H05H 9/045.

H05H 9/048

[N: Lepton LINACS]

Definition statement

This subclass/group covers:
Linear accelerators for lepton particles, e.g. electrons.

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

LEPTON	Elementary particle not subject to strong interaction

H05H 11/00

Magnetic induction accelerators, e.g. betatrons

Definition statement

This subclass/group covers:

Betatrons.

H05H 13/00

Magnetic resonance accelerators [N: (strophotrons, turbine tubes H01J25/62)]

Definition statement

This subclass/group covers:

Cyclotrons, synchrotrons, synchrocyclotrons, fixed-field alternating-gradient accelerators and microtrons.

Informative references

Attention is drawn to the following places, which may be of interest for search:

Strophotrons, turbine tubes	H01J 25/62

H05H 15/00

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

Definition statement

This subclass/group covers:

Systems and methods for accelerating or decelerating charged particles by means other than linear or magnetic resonance accelerators, e.g. laser pulses, resonance converters, magnetic monopole accelerators, dielectric-wall accelerators, inductive amplification of particle energy.