

G21K

HANDLING OF PARTICLES OR IONISING RADIATION NOT OTHERWISE PROVIDED FOR; IRRADIATION DEVICES; GAMMA RAY OR X-RAY MICROSCOPES

Definition statement

This place covers:

Arrangements for handling particles or ionising radiation, e.g. focusing or moderating;

Ionising radiation filters, e.g. X-ray filters;

Conversion screens for the conversion of the spatial distribution of particles or ionising radiation into visible images, e.g. fluoroscopic screens;

Irradiation devices;

Gamma ray or X-ray microscopes.

References

References out of a residual place

Examples of places in relation to which this place is residual:

Adaptations of reactors to facilitate experimentation or irradiation	G21C 23/00
Electron-optical arrangements in cathode ray tubes or electron beam tubes	H01J 29/46
Discharge tubes with provision for emergence of electrons or ions from the vessel; Lenard tubes	H01J 33/00
Discharge tubes with provision for introducing objects or material to be exposed to the discharge, e.g. for the purpose of examination or processing thereof	H01J 37/00
Electron or ion microscopes with scanning beams	H01J 37/28
Production or acceleration of neutral particle beams, e.g. molecular or atomic beams	H05H 3/00
Direct voltage accelerators; accelerators using single pulses	H05H 5/00
Targets for producing nuclear reactions	H05H 6/00
Details of linear accelerators, magnetic induction accelerators, cyclotrons and magnetic resonance accelerators	H05H 7/00
Linear accelerators	H05H 9/00
Magnetic induction accelerators, e.g. betatrons	H05H 11/00
Magnetic resonance accelerators; Cyclotrons	H05H 13/00
Methods or devices for acceleration of charged particles not otherwise provided for	H05H 15/00

Informative references

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

Investigating or analysing materials by the use of wave or particle radiation, e.g. X-rays or neutrons	G01N 23/00
Investigating or analysing materials by investigating the ionisation of gases	G01N 27/62
Scanning probe techniques or apparatus; applications of scanning probe techniques, e.g. scanning probe microscopy	G01Q
Particle spectrometers or separator tubes	H01J 49/00
X-ray apparatus involving X-ray tubes; circuits therefor	H05G 1/00
Apparatus or processes specially adapted for producing X-rays, not involving X-ray tubes, e.g. involving generation of plasma	H05G 2/00
Generating plasma; handling plasma	H05H 1/00

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

ionising radiation	'ionising radiation' consists of particles or electromagnetic waves that are sufficiently energetic to detach electrons from atoms or molecules, thus ionising them
particle	'particle' means a molecular, atomic or subatomic particle

G21K 1/00

Arrangements for handling particles or ionising radiation, e.g. focusing or moderating

Definition statement

This place covers:

- Diaphragms, collimators for handling ionizing radiation;
- Arrangements using diffraction, refraction or reflection, e.g. monochromators, for handling ionizing radiation;
- Deviation, concentration or focusing of the beam by electric or magnetic means;
- Scattering devices;
- Absorbing devices;
- Filters for ionising radiation.

References

Informative references

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

Moderators in nuclear reactors	G21C 5/00
Electric discharge tubes	H01J
Production or acceleration of neutrons, electrically charged particles or neutral molecular or atomic beams	H05H 3/00 - H05H 15/00

G21K 1/02**using diaphragms, collimators****Glossary of terms***In this place, the following terms or expressions are used with the meaning indicated:*

Collimator	Structure which achieves certain beam properties by absorbing those parts of the beam not having the desired properties, as opposed to structures which actively (through reflection or diffraction) change those properties.
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G21K 1/025**{using multiple collimators, e.g. Bucky screens; other devices for eliminating undesired or dispersed radiation}****Definition statement***This place covers:*

Devices selectively blocking rays according to their direction of propagation.

G21K 1/04**using variable diaphragms, shutters, choppers****Definition statement***This place covers:*

Devices selectively blocking rays according to the position on which they are incident onto the device.

G21K 1/043**{changing time structure of beams by mechanical means, e.g. choppers, spinning filter wheels}****Definition statement***This place covers:*

Devices such as choppers, scanning wheels e.g. "Nipkov disk"; filter wheels modulating the beam (i.e. continuously moving).

References**Limiting references***This place does not cover:*

Moving scattering grids	G21K 1/025
Scanning of charged particle beams	G21K 1/08 , G21K 1/093 , G21K 1/087

Informative references

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

Optical choppers	G02B 26/04
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Special rules of classification

For filter wheels modulating the beam (i.e. continuously moving), [G21K 1/10](#) has to be allocated as well.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

changing time structure	changing intensity, phase, polarisation or frequency over time
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G21K 1/046

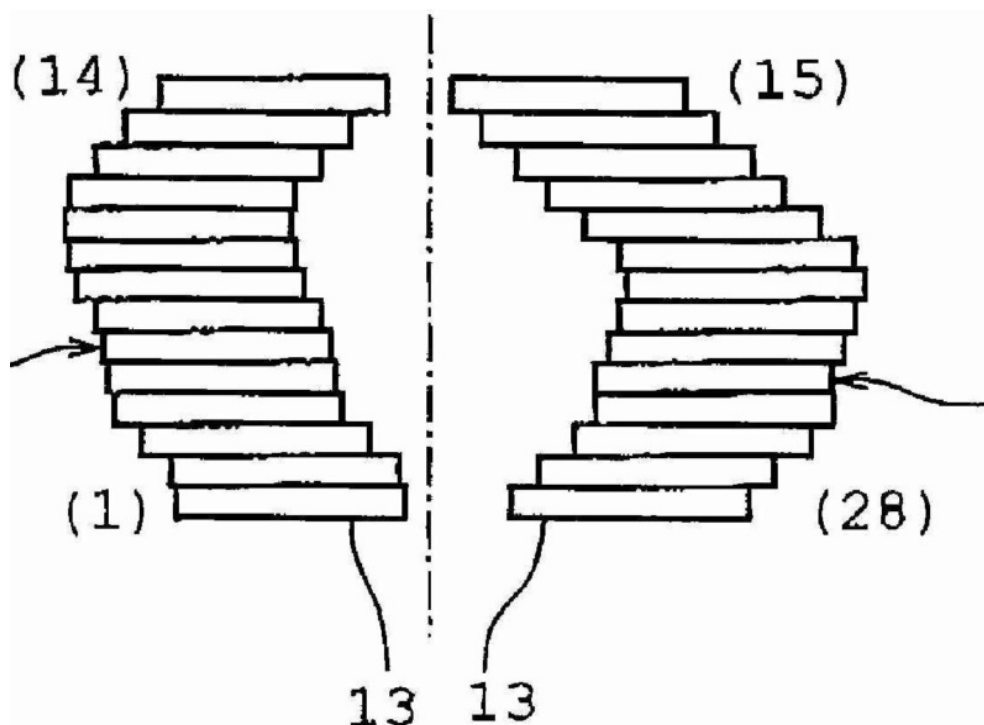
{varying the contour of the field, e.g. multileaf collimators}

Definition statement

This place covers:

Diaphragms allowing a variation of the shape of the field, in a way which goes beyond changing the dimensions or the orientation or the aspect ratio of the field, e.g. by use of a plurality of individually positionable strips.

Example:



US2009080619, Fig. 3

References

Limiting references

This place does not cover:

Iris diaphragms, setups changing only size or orientation of the irradiated region e.g. rectangular diaphragms	G21K 1/04
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G21K 1/06

using diffraction, refraction or reflection, e.g. monochromators ([G21K 1/10](#), [G21K 7/00](#) take precedence)

Definition statement

This place covers:

Devices such as crystals, and all other optics not covered by the definition of the subgroups.

References

Limiting references

This place does not cover:

Scattering devices; Absorbing devices; Ionising radiation filters	G21K 1/10
Gamma- or X-ray microscopes	G21K 7/00

Special rules of classification

Assignment of Indexing Codes [G21K 2201/062](#) - [G21K 2201/068](#) is obligatory as important information for further details.

Assignment of [G21K 2201/06](#) - [G21K 2201/068](#) as additional information is optional.

G21K 1/062

{Devices having a multilayer structure}

Definition statement

This place covers:

Devices having a multilayer structure such as multilayer mirrors, multilayer gratings; including multilayers used in Laue geometry.

References

Informative references

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

Multilayer mirrors for IR or visible or UV	G02B 5/0816
Mirrors for UV light	G02B 5/0891

Special rules of classification

Documents, which could potentially concern UV light and (soft or ultrasoft) X-rays due to the structure of the apparatus, or due to doubts if the wavelength range of intended operation is in the UV or the EUV / X-ray range, are to be classified in [G21K 1/062](#) and as well in appropriate places in [G02B 5/00](#).

G21K 1/065

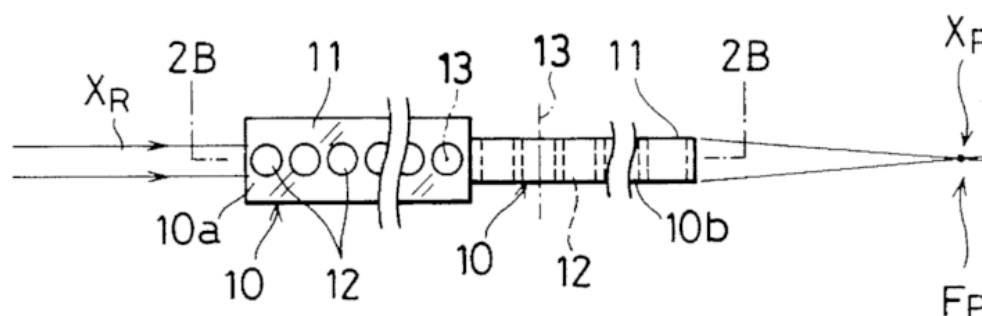
{using refraction, e.g. Tomie lenses}

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Tomie lens	compound refractive x-ray lens
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Example:



US5594773 (Tomie), Fig. 4a

G21K 1/067

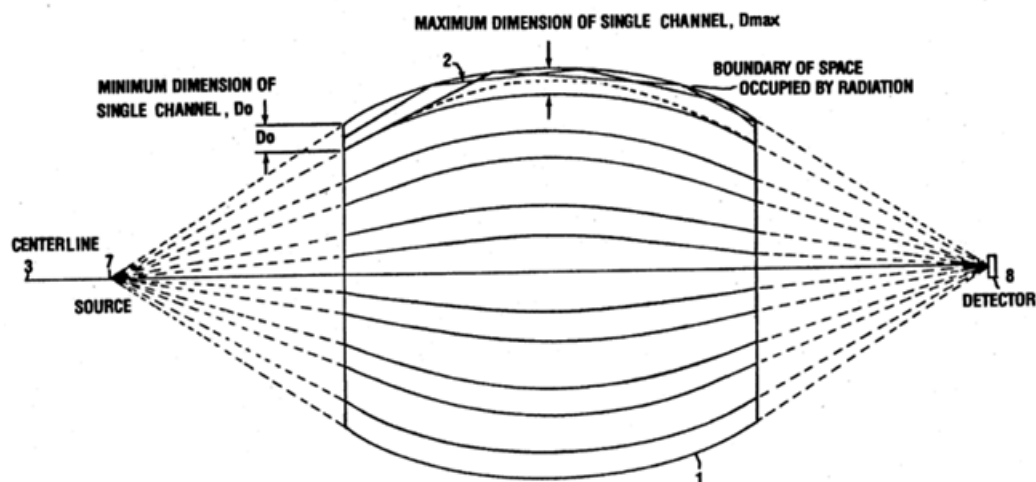
{using surface reflection, e.g. grazing incidence mirrors, gratings (multilayer mirrors [G21K 1/062](#))}

Definition statement

This place covers:

Grazing incidence mirrors, gratings or multicapillary lenses, e.g. Khumakov lenses.

Illustrative example of subject matter classified in this place:



References

Limiting references

This place does not cover:

Multilayer mirrors	G21K 1/062
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G21K 1/08

Deviation, concentration or focusing of the beam by electric or magnetic means (electron-optical arrangements in electric discharge tubes [H01J 29/46](#); {details, e.g. electric or magnetic deviating means for direct voltage accelerators or in accelerators using single pulses [H05H 5/02](#); arrangements for injecting particles into orbits [H05H 7/08](#); arrangements for ejecting particles from orbits [H05H 7/10](#)})

References

Limiting references

This place does not cover:

Electron optical arrangements in electric discharge tubes in cathode ray tubes	H01J 29/46
Electron optical arrangements in electric discharge tubes with provision for introducing objects	H01J 37/00
Electron optical arrangements in electric discharge tubes in particle spectrometers	H01J 49/00
Details, e.g. electric or magnetic deviating means for direct voltage accelerators or in accelerators using single pulses	H05H 5/02
Arrangements for injecting particles into orbits	H05H 7/08
Arrangements for ejecting particles from orbits	H05H 7/10

G21K 1/087**by electrical means****Definition statement**

This place covers:

Deviation, concentration or focusing of the beam by electrostatic means.

References**Limiting references**

This place does not cover:

Deviation, concentration or focusing of the beam by electromagnetic means	G21K 1/093
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G21K 1/10**Scattering devices; Absorbing devices; Ionising radiation filters****Definition statement**

This place covers:

Wavelength selective filter for X rays

References**Informative references**

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

Energy modification of the final beam	H05H 7/12
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G21K 1/20**for confining charged particles or handling confined charged particles, e.g. ion traps****Definition statement**

This place covers:

Arrangements or techniques for confining charged particles or manipulating confined charged particles, such as ion traps. Examples of techniques for confining or manipulating of the confined charged particles are magnetic or optical levitation techniques.

This place also covers containers for antimatter.

References**References out of a residual place**

Examples of places in relation to which this place is residual:

Physical realisations or architectures of quantum processors or components for manipulating qubits, e.g. qubit coupling or qubit control	G06N 10/40
Mass spectrometers or separator tubes	H01J 49/26

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

radiation pressure	pressure exerted upon any surface exposed to electromagnetic radiation. If absorbed, the pressure is the power flux density divided by the speed of light. If the radiation is totally reflected, the radiation pressure is doubled.
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G21K 1/30

for confining neutral particles or handling confined neutral particles, e.g. atom traps

Definition statement

This place covers:

Arrangements or techniques for confining neutral particles or manipulating confined neutral particles, such as atom traps. Examples of arrangements for confining or manipulating of the confined neutral particles are magneto-optical atom traps.

This place also covers containers for antimatter.

References

References out of a residual place

Examples of places in relation to which this place is residual:

Manufacture or treatment of nanostructures by manipulation of individual atoms or molecules	B82B 3/00
Apparatus for producing preselected time intervals for use as timing standards using atomic clocks	G04F 5/14
Physical realisations or architectures of quantum processors or components for manipulating qubits, e.g. qubit coupling or qubit control	G06N 10/40

G21K 4/00

Conversion screens for the conversion of the spatial distribution of X-rays or particle radiation into visible images, e.g. fluoroscopic screens (photographic processes using X-ray intensifiers [G03C 5/17](#); discharge tubes comprising luminescent screens [H01J 1/62](#); cathode ray tubes for X-ray conversion with optical output [H01J 31/50](#))

Definition statement

This place covers:

Conversion screens for the conversion of the spatial distribution of X-rays or particle radiation into visible images, e.g. fluoroscopic screens

References

Informative references

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

Photographic processes using X-rays; using screens to intensify X-ray images	G03C 5/16 , G03C 5/17
In discharge tubes: screens on or from which an image or pattern is formed; luminescent screens	H01J 1/54 , H01J 1/62
In cathode ray tubes or electron beam tubes: image conversion tubes or image amplification tubes having an X-ray input and an optical output	H01J 31/50

G21K 5/00

Irradiation devices (discharge tubes for irradiating [H01J 37/00](#))

Definition statement

This place covers:

This main group contains devices for the irradiation of an object with ionising radiation such as X-rays or electron radiation.

References

Limiting references

This place does not cover:

Conservation of food	A23B
Preserving, protecting, or purifying packages or package content by irradiation	B65B 55/08
Discharge tubes with provision for emergence of electrons or ions from the vessel	H01J 33/00
Discharge tubes for irradiating	H01J 37/00
Discharge tubes with provision for introducing objects or material to be exposed to the discharge	H01J 37/30
Ion implanters	H01J 37/3171
Electron beam or ion beam lithography	H01J 37/3174

Informative references

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

General disinfection or sterilisation of materials or objects by radiation	A61L 2/08
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Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Irradiation	Exposure of an item to radiation with the aim to achieve a certain effect in the item, as opposed to techniques aiming at obtaining information from an item e.g. by analysis, obtaining images etc.
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G21K 5/04

with beam-forming means

Definition statement

This place covers:

Inter aliae, apparatus aspects of beam outlets for radiation therapy.

Special rules of classification

Additional assignment of a group symbol of [G21K 1/00](#) is mandatory whenever the means used for beam forming are relevant.

G21K 7/00

Gamma- or X-ray microscopes

Definition statement

This place covers:

Gamma- or X-ray microscopes