Appendix A
The Treaty on the Non-proliferation of Nuclear Weapons

Notification of the Entry into Force

1. By letters addressed to the Director General on 5, 6 and 20 March 1970 respectively, the Governments of the United Kingdom of Great Britain and Northern Ireland, the United States of America and the Union of Soviet Socialist Republics, which are designated as the Depositary Governments in Article IX. 2 of the Treaty on the Non-Proliferation of Nuclear Weapons, informed the Agency that the Treaty had entered into force on 5 March 1970.
2. The text of the Treaty, taken from a certified true copy provided by one of the Depositary Governments, is reproduced below for the convenience of all Members.

Treaty on the Non-proliferation of Nuclear Weapons

The States concluding this Treaty, hereinafter referred to as the "Parties to the Treaty".

Considering the devastation that would be visited upon all mankind by a nuclear war and the consequent need to make every effort to avert the danger of such a war and to take measures to safeguard the security of peoples, Believing that the proliferation of nuclear weapons would seriously enhance the danger of nuclear war.

In conformity with resolutions of the United Nations General Assembly calling for the conclusion of an agreement on the prevention of wider dissemination of nuclear weapons, Undertaking to co-operate in facilitating the application of International Atomic Energy Agency safeguards on peaceful nuclear activities.

Expressing their support for research, development and other efforts to further the application, within the framework of the International Atomic Energy Agency safeguards system, of the principle of safeguarding effectively the flow of source and special fissionable materials by use of instruments and other techniques at certain strategic points.

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Affirming the principle that the benefits of peaceful applications of nuclear technology, including any technological by-products which may be derived by nuclear-weapon States from the development of nuclear explosive devices, should be available for peaceful purposes to all Parties to the Treaty, whether nuclear-weapon or non-nuclear-weapon States.

Convinced that, in furtherance of this principle, all Parties to the Treaty are entitled to participate in the fullest possible exchange of scientific information for, and to contribute alone or in co-operation with other States to, the further development of the applications of atomic energy for peaceful purposes.

Declaring their intention to achieve at the earliest possible date the cessation of the nuclear arms race and to undertake effective measures in the direction of nuclear disarmament.

Urging the co-operation of all States in the attainment of this objective.

Recalling the determination expressed by the Parties to the 1963 Treaty banning nuclear weapon tests in the atmosphere, in outer space and under water in its Preamble to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time and to continue negotiations to this end.

Desiring to further the easing of international tension and the strengthening of trust between States in order to facilitate the cessation of the manufacture of nuclear weapons, the liquidation of all their existing stockpiles, and the elimination from national arsenals of nuclear weapons and the means of their delivery pursuant to a Treaty on general and complete disarmament under strict and effective international control.

Recalling that, in accordance with the Charter of the United Nations, States must refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any State, or in any other manner inconsistent with the Purposes of the United Nations, and that the establishment and maintenance of international peace and security are to be promoted with the least diversion for armaments of the world's human and economic resources.

Have agreed as follows:

Article I

Each nuclear-weapon State Party to the Treaty undertakes not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in any way to assist, encourage, or induce any non-nuclear-weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices.

Article II

Each non-nuclear-weapon State Party to the Treaty undertakes not to receive the transfer from any transferor whatsoever of nuclear weapons or other nuclear explosive devices or of control over such weapons or explosive devices directly, or indirectly; not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices; and not to seek or receive any assistance in the manufacture of nuclear weapons or other nuclear explosive devices.

Article III

1. Each Non-nuclear-weapon State Party to the Treaty undertakes to accept safeguards, as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency in accordance with the Statute of the International Atomic Energy Agency and the Agency's safeguards system, for the exclusive purpose of verification of the fulfillment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices. Procedures for the safeguards required by this Article shall be followed with respect to source or special fissionable material whether it is being produced, processed or used in any principal nuclear facility or is outside any such facility. The safeguards required by this Article shall be applied on all source or special fissionable material in all peaceful nuclear activities within the territory of such State, under its jurisdiction, or carried out under its control anywhere.
2. Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material, to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this Article.
3. The safeguards required by this Article shall be implemented in a manner designed to comply with Article IV of this Treaty, and to avoid hampering the economic or technological development of the Parties or international co-operation in the field of peaceful nuclear activities, including the international exchange of nuclear material and equipment for the processing, use or production of nuclear material for peaceful purposes in accordance with the provisions of this Article and the principle of safeguarding set forth in the Preamble of the Treaty.
4. Non-nuclear-weapon States Party to the Treaty shall conclude agreements with the International Atomic Energy Agency to meet the requirements of this Article either individually or together with other States in accordance with the Statute of the International Atomic Energy Agency. Negotiation of such agreements shall commence within 180 days from the original entry into force of this Treaty. For States depositing their instruments of ratification or accession after the 180-day period, negotiation of such agreements shall commence not later than the date of such deposit. Such agreements shall enter into force not later than eighteen months after the date of initiation of negotiations.

Article IV

1. Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with Articles I and II of this Treaty.
2. All the Parties to the Treaty undertake to facilitate, and have the right to participate in. the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. Parties to the Treaty in a position to do so shall also cooperate in contributing alone or together with other States or international organizations to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States Party to the Treaty, with due consideration for the needs of the developing areas of the world.

Article V

Each Party to the Treaty undertakes to take appropriate measures to ensure that, in accordance with this Treaty, under appropriate international observation and through appropriate international procedures, potential benefits from any peaceful applications of nuclear explosions will be made available to non-nuclear-weapon States Party to the Treaty on a non-discriminatory basis and that the charge to such Parties for the explosive devices used will be as low as possible and exclude any charge for research and development. Non-nuclear weapon States Party to the Treaty shall be able to obtain such benefits, pursuant to a special international agreement or agreements, through an appropriate international body with adequate representation of non-nuclear-weapon States. Negotiations on this subject shall commence as soon as possible after the Treaty enters into force. Non-nuclear-weapon States Party to the Treaty so desiring may also obtain such benefits pursuant to bilateral agreements.

Article VI

Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.

Article VII

Nothing in this Treaty affects the right of any group of States to conclude regional treaties in order to assure the total absence of nuclear weapons in their respective territories.

Article VIII

1. Any Party to the Treaty may propose amendments to this Treaty. The text of any proposed amendment shall be submitted to the Depositary Governments which shall circulate it to all Parties to the Treaty. Thereupon, if requested to do so by one-third or more of the Parties to the Treaty, the Depositary Governments shall convene a conference, to which they shall invite all the Parties to the Treaty, to consider such an amendment.
2. Any amendment to this Treaty must be approved by a majority of the votes of all the Parties to the Treaty, including the votes of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. The amendment shall enter into force for each Party that deposits its instrument of ratification of the amendment upon the deposit of such instruments of ratification by a majority of all the Parties, including the instruments of ratification of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. Thereafter, it shall enter into force for any other Party upon the deposit of its instrument of ratification of the amendment.
3. Five years after the entry into force of this Treaty, a conference of Parties to the Treaty shall be held in Geneva, Switzerland, in order to review the operation of this Treaty with a view to assuring that the purposes of the Preamble and the provisions of the Treaty are being realised. At intervals of five years thereafter. a majority of the Parties to the Treaty may obtain, by submitting a proposal to this effect to the Depositary Governments, the convening of further conferences with the same objective of reviewing the operation of the Treaty.

Article IX

1. This Treaty shall be open to all States for signature. Any State which does not sign the Treaty before its entry into force in accordance with paragraph 3 of this Article may accede to it at any time.
2. This Treaty shall be subject to ratification by signatory States. Instruments of ratification and instruments of accession shall be deposited with the Governments of the United Kingdom of Great Britain and Northern Ireland, the Union of Soviet

Socialist Republics and the United States of America, which are hereby designated the Depositary Governments.

3. This Treaty shall enter into force after its ratification by the States, the Governments of which are designated Depositaries of the Treaty, and forty other States signatory to this Treaty and the deposit of their instruments of ratification. For the purposes of this Treaty, a nuclear weapon State is one which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January, 1967.
4. For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Treaty, it shall enter into force on the date of the deposit of their instruments of ratification or accession.
5. The Depositary Governments shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or of accession, the date of the entry into force of this Treaty, and the date of receipt of any requests for convening a conference or other notices.
6. This Treaty shall be registered by the Depositary Governments pursuant to Article 102 of the Charter of the United Nations.

Article X

1. Each Party shall in exercising its national sovereignty have the right to withdraw from the Treaty if it decides that extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interests of its country. It shall give notice of such withdrawal to all other Parties to the Treaty and to the United Nations Security Council three months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.
2. Twenty-five years after the entry into force of the Treaty, a conference shall be convened to decide whether the Treaty shall continue in force indefinitely, or shall be extended for an additional fixed period or periods. This decision shall be taken by a majority of the Parties to the Treaty.

Article XI

This Treaty, the English, Russian, French, Spanish and Chinese texts of which are equally authentic, shall be deposited in the archives of the Depositary Governments. Duly certified copies of this Treaty shall be transmitted by the Depositary Governments to the Governments of the signatory and acceding States.

IN WITNESS WHEREOF the undersigned, duly authorised, have signed this Treaty. DONE in triplicate, at the cities of London, Moscow and Washington, the first day of July, one thousand nine hundred and sixty-eight.

Appendix B
The Atomic Energy Act

The AEA, as amended, sets forth the procedures and requirements for the U.S. governments negotiating, proposing, and entering into nuclear cooperation agreements with foreign partners. The AEA, as amended, requires that U.S. peaceful nuclear cooperation agreements contain the following nine provisions:

1. Safeguards: Safeguards, as agreed to by the parties, are to be maintained over all nuclear material and equipment transferred, and all special nuclear material used in or produced through the use of party, irrespective of the duration of other provisions in the agreement or whether the agreement is terminated or suspended for any reason. Such safeguards are known as “safeguards in perpetuity.”
2. Full-scope IAEA safeguards as a condition of supply: In the case of non-nuclear weapons states, continued U.S. nuclear supply is to be conditioned on the maintenance of IAEA full-scope safeguards over all nuclear materials in all peaceful nuclear activities within the territory, under the jurisdiction, or subject to the control of the cooperating party.
3. Peaceful use guaranty: The cooperating party must guarantee that it will not use the transferred nuclear materials, equipment, or sensitive nuclear technology, or any special nuclear material produced through the use of such, for any nuclear explosive device, for research on or development of any nuclear explosive device, or for any other military purpose.
4. Right to require return: An agreement with a non-nuclear weapon state must stipulate that the United States has the right to require the return of any transferred nuclear materials and equipment, and any special nuclear material produced through the use thereof, if the cooperating party detonates a nuclear device, or terminates or abrogates an agreement providing for IAEA safeguards.
5. Physical security: The cooperating party must guarantee that it will maintain adequate physical security for transferred nuclear material and any special nuclear material used in or produced through the use of any material, or production or utilization facilities transferred pursuant to the agreement.
6. Retransfer rights: The cooperating party must guarantee that it will not transfer any material, Restricted Data, or any production or utilization facility transferred

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pursuant to the agreement,or any special nuclear material subsequently produced through the use of any such transferred material, or facilities, to unauthorized persons or beyond its jurisdiction or control, without the consent of the United States.

7. Restrictions on enrichment or reprocessing of U.S.-obligated material: The cooperating party must guarantee that no material transferred, or used in, or produced through the use of transferred material or production or utilization facilities, will be reprocessed or enriched, or with respect to plutonium, uranium- 233, HEU, or irradiated nuclear materials, otherwise altered in form or content without the prior approval of the United States.
8. Storage facility approval: The cooperating party must guarantee not to store any plutonium, uranium-233, or HEU that was transferred pursuant to a cooperation agreement, or recovered from any source or special nuclear material transferred, or from any source or special nuclear material used in a production facility or utilization facility transferred pursuant to the cooperation agreement, in a facility that has not been approved in advance by the United States.
9. Additional restrictions: The cooperating party must guarantee that any special nuclear material, production facility, or utilization facility produced or constructed under the jurisdiction of the cooperating party by or through the use of transferred sensitive nuclear technology, will be subject to all the requirements listed above.

Appendix C
The Area Under the ROC Curve for Gaussian Probability Distributions

The formula for the area under the curve (AUC) for a receiver operator characteristic (ROC) derived from gaussian probability distributions is derived here.

Let the probability distribution of the positives be given by

$$\mathrm{p}(x) = \frac{1}{\sqrt{2\pi}\sigma_1}\exp\left(-\frac{(\mathrm{x}-\mu_1)^2}{2\sigma_1^2}\right)$$

Note that $\int_{-\infty}^{+\infty}\mathrm{p(x)dx} = 1$.

Similarly, let the probability distribution of the negatives be given by

$$\mathrm{n(x)} = \frac{1}{\sqrt{2\pi}\sigma_2}\exp\left(-\frac{(x-\mu_2)^2}{2\sigma_2^2}\right)$$

The true positive rate TPR(x) is given by the integral of the positive rate from the threshold x to infinity, i.e.

$$\begin{aligned}\mathrm{TPR(x)} &= \int_{\mathrm{x}}^{\infty}\mathrm{p(x')dx'}\\ &= \tfrac{1}{\sqrt{2\pi}\sigma_1}\int_{\mathrm{x}}^{\infty}\exp\left(-\frac{(\mathrm{x}'-\mu_1)^2}{2\sigma_1^2}\right)\mathrm{dx}'\\ &= \tfrac{1}{2}\mathrm{erfc}\left(\tfrac{\mathrm{x}-\mu_1}{\sqrt{2}\sigma_1}\right)\end{aligned}$$

and the false positive rate FPR(x) is given similarly by

$$\begin{aligned}\mathrm{FPR(x)} &= \int_{\mathrm{x}}^{\infty}\mathrm{n(x')dx'}\\ &= \tfrac{1}{2}\mathrm{erfc}\left(\tfrac{\mathrm{x}-\mu_2}{\sqrt{2}\sigma_2}\right)\end{aligned}$$

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The area under the curve (AUC) is given by

$$\begin{aligned}
\mathrm{AUC} &= \int_0^1 \mathrm{TPR}\ |\mathrm{d(FPR)}| \\
&= \int_{-\infty}^{+\infty} \mathrm{TPR(x)} \left| \frac{\mathrm{d(FPR(x))}}{\mathrm{dx}} \right| \mathrm{dx} \\
&= \int_{-\infty}^{+\infty} \mathrm{TPR(x)n(x)dx} \\
&= \int_{-\infty}^{+\infty} \frac{1}{2}\mathrm{erfc}\left(\frac{\mathrm{x}-\mu_1}{\sqrt{2}\sigma_1}\right)\left[\frac{1}{\sqrt{2\pi}\sigma_2}\exp\left(-\frac{(\mathrm{x}-\mu_2)^2}{2\sigma_2^2}\right)\right]\mathrm{dx}
\end{aligned}$$

This integral is essentially a double integral, since erfc is an integral over a gaussian. We deal with this by replacing the function erfc with a substitution

$$\mathrm{erfc}\left(\frac{\mathrm{x}-\mu_1}{\sqrt{2}\sigma_1}\right) = -\frac{2}{\sqrt{\pi}}\int_0^{+\infty}\exp\left(-\left(\frac{\mathrm{x}-\mu_1}{\sqrt{2}\sigma_1}-\mathrm{x}'\right)^2\right)\mathrm{dx}' + 2$$

The AUC integral contains two terms; call them I_1 and I_2, with I_2 standing for the part of the above expression for the AUC with the $+2$ term in the above expression for erfc, and I_1 representing the part with the double integral. I_2 integrates easily:

$$\mathrm{I}_2 = \int_{-\infty}^{+\infty}\frac{1}{2}(2)\left[\frac{1}{\sqrt{2\pi}\sigma_2}\exp\left(-\frac{(\mathrm{x}-\mu_2)^2}{2\sigma_2^2}\right)\right]\mathrm{dx} = 1.$$

The other term results in a double integral

$$\begin{aligned}
\mathrm{I}_1 = -\frac{1}{2}\frac{2}{\sqrt{\pi}}\int_{-\infty}^{+\infty}&\left[\int_0^{+\infty}\exp\left(-\left(\frac{\mathrm{x}-\mu_1}{\sqrt{2}\sigma_1}-\mathrm{x}'\right)^2\right)\mathrm{dx}'\right] \\
&\times\left[\frac{1}{\sqrt{2\pi}\sigma_2}\exp\left(-\frac{(\mathrm{x}-\mu_2)^2}{2\sigma_2^2}\right)\right]\mathrm{dx}
\end{aligned}$$

Both integrals have fixed end points, so the order of integration can be reversed:

$$\begin{aligned}
\mathrm{I}_1 = -\frac{1}{2}\frac{1}{\sqrt{2\pi}\sigma_2}\frac{2}{\sqrt{\pi}}\int_0^{+\infty}\int_{-\infty}^{+\infty}&\left[\exp\left(-\left(\frac{\mathrm{x}-\mu_1}{\sqrt{2}\sigma_1}-\mathrm{x}'\right)^2\right)\right] \\
\times&\left[\exp\left(-\frac{(\mathrm{x}-\mu_2)^2}{2\sigma_2^2}\right)\right]\mathrm{dx\,dx}'
\end{aligned}$$

We can evaluate the inner integral by completing the square. The result is

$$\mathrm{I}_1 = \frac{\sigma_1}{\sqrt{\pi}\sqrt{\sigma_1^2+\sigma_2^2}}\int_0^{\infty}\exp\left[-\frac{\mathrm{x}'^2\sigma_1^2}{\sigma_1^2+\sigma_2^2}-\frac{\mathrm{x}'\left(2\sqrt{2}\mu_1\sigma_1-2\sqrt{2}\mu_2\sigma_1\right)}{2\left(\sigma_1^2+\sigma_2^2\right)}-\frac{\mu_1^2-2\mu_2\mu_1+\mu_2^2}{2\left(\sigma_1^2+\sigma_2^2\right)}\right]\mathrm{dx}'$$

And this gives

$$\mathrm{AUC} = \mathrm{I}_1 + \mathrm{I}_2 = 1 - \frac{1}{2}\mathrm{erfc}\left(\frac{\mu_1 - \mu_2}{\sqrt{2}\sqrt{\sigma_1^2 + \sigma_2^2}}\right) = \frac{1}{2} + \frac{1}{2}\mathrm{erf}\left(\frac{\mu_1 - \mu_2}{\sqrt{2}\sqrt{\sigma_1^2 + \sigma_2^2}}\right)$$

or equivalently

$$\mathrm{AUC} = \frac{1}{2}\mathrm{erfc}\left(-\frac{\mu_1 - \mu_2}{\sqrt{2}\sqrt{\sigma_1^2 + \sigma_2^2}}\right).$$

Glossary

Actinide Elements with atomic number between 89 and 103
Adsorption A process where a gas, liquid or dissolved solid adheres to a surface
Alpha emission spectroscopy Analysis of a sample by the energy distrubution of alpha particles
Areal density The product of mass density and thickness
Asymptotic Limits of functions at extreme values of parameters
Avogadro's constant Number of atoms in a gram-mole $= 6.02 \times 10^{23}$
Boltzmann law Equation relating density and pressure variations with potential energy in thermodynamic equilibrium
Boltzmann transport equation An equation describing the movement of particles in velocity space, physical space, and time
Boltzmann's constant Constant relating average energy and temperature in a gas or plasma
Boosting Weapon yield enhancement by use of fusion reactions
Bragg equation An equation showing the X-ray diffraction angles in X-ray in a crystal
Breit-Wigner form A model of the energy dependence of a resonant state in an atom or nucleus
Bremsstrahlung Radiation produced by the interaction of electrons with atomic nuclei
Bridgman method A crystal-growing method in which a melting zone travels slowly through the powder charge
Brunt-Väisälä frequency A frequency of stable oscillation in the atmosphere caused by buoyancy
Burnup Consumption of fissile material due to fission reactions
BWR Boiling Water Reactor
Calcines Heating a solid material to drive off water, oxygen, and other gases
Carbogenic molecular sieve Molecular sieve containing folded graphite or other carbon-based structure
Cerenkov effect Production of light be electrons in a medium where the electrons are traveling faster than the light speed in that medium

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Child-Langmuir limit Limit of current in a beam of charged particles due to electrostatic space charge
Compton collisions Elastic collisions between electrons and photons
Compton kinematic discrimination Algorithm to use Compton-scattetred photons to generate a two-dimensional image
Compton upshift Production of high-energy photons by interaction of low energy photons with an electron beam
Convolving Taking an integration of a source term with a propagation function
Core valence luminescence Radiative recombination of holes in the upper core band into the valence band
Coriolis forces Force acting on a moving object in a rotating system
Cosmogenic Created by interaction of airborne and surface nuclei with cosmic rays
Coulombic forces Repulsive electrostatic forces between nuclear particles
Démarche An official diplomatic protest or request
De-excitation Return of a nucleus or atom to its ground, or lowest energy, state
Debye temperature A temperature in a solid equivalent to the energy of the highest vibrational state
Decoupled A condition where an underground nuclear explosion is not well connected to the surrounding rock
Desorption A process where a gas or liquid is released from a solid material
Deuteron photodissociation The splitting of a deuteron into a proton and a neutron
Die-away time Time for a reduction in neutron count rate by a factor of $e = 2.718$
Dielectric constant The ratio of the electrical permittivity of a material to that of free space
Discrete ordinate methods Neutron transport equations using a rid in space and groups of energy and angle
Doppler broadening Increase in spectral line width due to random thermal motion
Doppler shift A shift in frequency of a wave caused by the velocity of the generator or observer
e-folding The time or distance for a signal to be attenuated by a factor of $e = 2.718$
Eikonal A theory of wave propagation which assumes that changes in the medium happen slowly
Electron Capture Capture of an electron by an atomic nucleus
Eutectoid A material that has two distinct phases coming lead together
Even-even actinides Actinides with an even number of both protons and neutrons
Exciton A quantum-mechanical state in which an electronhole pair travel together
Fano factor Reduction in statistical variance due to collective effects
Faraday cups Electrodes for collecting charged particles
Fermat's principle A principle that says that the path that a wave will take is the one which takes the minimum time
Fermi age model A method of treating the slowing down of fast neutrons to thermal energies
Fick's law Equation relating diffusive flux to concentration gradient

Fractionation Changes in elemental concentrations due to variations in transport properties

Fuel shuffle Movement of fuel rods in a reactor to even out the burnup

Gamma-ray spectroscopy Identification of nuclei through gamma-ray emissions

Gaussian distribution Limiting form of a Poisson distribution when the mean becomes large

Graphite-moderated reactor A reactor using graphite to slow fission neutrons to thermal energies

Green body An intermediate phase of creating a ceramic

Green's function kernel An expression used to solve a differential equation with a source term

Hecht equation An equation describing the efficiency of charge collection in a semiconductor

Heisenberg relation An expression for the uncertainty of the positionmomentum product or the energy time product and Planck's constant $\hbar$

High-Z elements Elements with a high atomic number, such as U or Pb

Highly enriched uranium Uranium containing more that 20 % ^{235}U

Histogram A plot of the number of events observed for each measurement value

Hot isostatic press A method to increase the density of a material by using heat and pressure, usually with an inert gas

Hydroacoustic Acoustic wave traveling through water

Hygroscopic Prone to absorb water

Indium resonance energy The energy at which a large cross section for capture exists in indium at 1.46 eV

Inverse barns Fluence in units of 10^{+24} cm^{-2}

Jacobi symbol A mathematical operator on two integers that returns a single integer

Kalinowski line A line in Xe isotope ratio space separating reactor produced Xe from nuclear explosive produced Xe

Lagrangian fluid model A fluid description where the coordinate system moves with the fluid

Lamb wave An atmospheric wave which is localized to the earth's surface

Laplacian operator $\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2}$

Laser wakefield acceleration Production of high-energy particles by intense laser pulses

Love wave A wave located near the surface of a solid or liquid with a motion perpendicular to the direction of travel and in the plane of the surface

Mach number Ratio of velocity to speed of sound

Mass attenuation coefficient Gamma attenuation coefficient divided by mass density

Mass spectrometry Analysis of a sample by the atomic mass distribution in the material

Matthews correlation coefficient Metric for the quality of a binary qualifier

Maxwellian An energy distribution following Maxwell-Boltzmann statistics, i.e. $f(E)\,\alpha\sqrt{E}\exp(-E/T)$
Millibarn 10^{-27} cm^2
Miscibility The ability of two substances to exist in solution together
Monte Carlo Computational method based on random numbers
Natural abundance The fraction of an isotope of an element that is found naturally compared to all isotopes of that element
Nebulizer Device for making fog-like mixtures
Neutron capture Capture of a neutron by an atomic nucleus
Odd-odd nuclide A nuclide with an odd number of both protons and neutrons
Orbital states Energy states in an atom
Pig Shieldded container for radioactive materials
Poisson distribution Distribution expected for any number of uncorrelated events
PWR Pressurized Water Reactor
Quaternary Having four distinct parts
Radioxenon radioactive xenon isotopes
Rayleigh wave A wave located near the surface of a solid or liquid with an elliptical motion
RMS thermal velocity The root-mean-square average velocity of particles at some temperature
Roentgen Unit of radiation exposure, roughly equal to rads
Saggital focusing double Laue monochromator A device used in X-ray diffraction analysis
Scintillation detector A radiation detector based on conversion of nuclear particles or gamma rays into low-energy photons
Self-attenuation Absorption of gamma rays or particles within the material generating them
Sintered Conversion of a material into a high-density format using heat and pressure
SOFAR channel Acoustic waveguide in seawater at 500–1000 m depth
Solid-state germanium detectors Radiation detectors based on conversion of gamma rays into electron-hole pairs in germanium
Spallation Breakup of nuclei by energetic particles
Species One isotope of an element
Spline Connection of data points using smooth algebraic functions
Sterradian Unit of solid angle $= \int d\cos\theta\, d\phi$
Stoichiometric coefficient The subscripts in a chemical formula showing the number of atoms per molecule
Sublimation Conversion of a substance from a solid to a gas without an intermediate liquid phase
Surface-barrier semiconductor diode detectors Detectors used for α counting with a metallic contact on the back side and no diffused n-type layer
T-phase seismic wave Seismic wave resulting from a hydroacoustic wave
Ternary Having three distinct parts

Thermal neutron cross sections Neutron cross sections averaged over a thermal energy spectrum

Torr Unit of pressure equal to one mm Hg. 1.0 atm $\approx$ 760 torr

Vitrified Converted into a glass-like substance

Wavenumber $2\pi/\lambda$, where λ is the wavelength

WGU Weapon Grade Uranium; enriched to $>90\,\%$ ^{235}U

Yukawa kernel An alternative to the Fermi age model useful for hydrogenous media

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