SI units

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Introduction

The editors agreed that the Système International d’Unités (SI), the International System of Units, should be followed as closely as possible in order to arrive at a consistent presentation of the photon measurements. To achieve this goal the following guidelines have been provided, and their use has been strongly advocated. Nevertheless, some non-SI units that have been used in this book—although not recommended for use with SI—are defined in terms of SI units in this appendix.

Writing of physical quantities and equations

SI is based on the international metre convention, and is the legal system in most countries. The rules and style conventions for SI have been issued by the Bureau International des Poids et Mesures (BIPM 2006).1 In this guide, the SI rules and conventions that are most relevant for the present book are categorized by *** : required; ** : recommended; * : avoid (needs explanation); — : not permitted.

Physical quantities:
** The value of a physical quantity is the product of a number and a unit symbol, for instance, \( P = 1 \, \text{W} \) for a power of one watt.
*** \( 20 \, \text{cm} \pm 2 \, \text{cm} \) or \( (20 \pm 2) \, \text{cm} \), — not \( 20 \pm 2 \, \text{cm} \).

Units:
*** Use, for instance, ... 1 m to 10 m ... or ... (1 to 10) m,
— not 1 – 10 m.
** Symbols for the quantities are recommendations only,
*** but the correct form of the unit symbols is mandatory, i.e., they must not be

1MPS—Max-Planck-Institut für Sonnensystemforschung, Katlenburg-Lindau, Germany
2PSI—Paul Scherrer Institut, Villigen, Switzerland
3UCL, MSSL—University College London/Mullard Space Science Laboratory, UK
4Nightsen, Inc., Tiverton RI, USA

1Available at www.bipm.fr/utils/common/pdf/si_brochure_8_fr.pdf in the official French version and at ..._en.pdf in English. For the English style conventions see also the Special Publication 811 of the National Institute of Standards and Technology (NIST) at physics.nist.gov/Pubs/SP811/sp811.html.
Table 41.1: SI prefixes

<table>
<thead>
<tr>
<th>Factor</th>
<th>Prefix name</th>
<th>Symbol</th>
<th>Factor</th>
<th>Prefix name</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10^1$</td>
<td>deca</td>
<td>da</td>
<td>$10^{-1}$</td>
<td>deci</td>
<td>d</td>
</tr>
<tr>
<td>$10^2$</td>
<td>hecto</td>
<td>h</td>
<td>$10^{-2}$</td>
<td>centi</td>
<td>c</td>
</tr>
<tr>
<td>$10^3$</td>
<td>kilo</td>
<td>k</td>
<td>$10^{-3}$</td>
<td>milli</td>
<td>m</td>
</tr>
<tr>
<td>$10^6$</td>
<td>mega</td>
<td>M</td>
<td>$10^{-6}$</td>
<td>micro</td>
<td>µ</td>
</tr>
<tr>
<td>$10^9$</td>
<td>giga</td>
<td>G</td>
<td>$10^{-9}$</td>
<td>nano</td>
<td>n</td>
</tr>
<tr>
<td>$10^{12}$</td>
<td>tera</td>
<td>T</td>
<td>$10^{-12}$</td>
<td>pico</td>
<td>p</td>
</tr>
<tr>
<td>$10^{15}$</td>
<td>peta</td>
<td>P</td>
<td>$10^{-15}$</td>
<td>femto</td>
<td>f</td>
</tr>
<tr>
<td>$10^{18}$</td>
<td>exa</td>
<td>E</td>
<td>$10^{-18}$</td>
<td>atto</td>
<td>a</td>
</tr>
<tr>
<td>$10^{21}$</td>
<td>zetta</td>
<td>Z</td>
<td>$10^{-21}$</td>
<td>zepto</td>
<td>z</td>
</tr>
<tr>
<td>$10^{24}$</td>
<td>yotta</td>
<td>Y</td>
<td>$10^{-24}$</td>
<td>yocto</td>
<td>y</td>
</tr>
</tbody>
</table>

*a A unit symbol must be added without space, e.g., 1 GW is one gigawatt.

Table 41.2: SI base units

<table>
<thead>
<tr>
<th>Base quantity</th>
<th>Symbol</th>
<th>Unit name</th>
<th>Unit symbol</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>$l$</td>
<td>metre*a</td>
<td>m</td>
<td>1983*b</td>
</tr>
<tr>
<td>Mass</td>
<td>$m$</td>
<td>kilogram*c</td>
<td>kg</td>
<td>1889*b</td>
</tr>
<tr>
<td>Time, duration</td>
<td>$t$</td>
<td>second*d</td>
<td>s</td>
<td>1967*b</td>
</tr>
<tr>
<td>Electric current</td>
<td>$i$</td>
<td>ampere*e</td>
<td>A</td>
<td>1946*f</td>
</tr>
<tr>
<td>Thermodynamic temperature</td>
<td>$T$</td>
<td>kelvin*g</td>
<td>K</td>
<td>1954*b</td>
</tr>
<tr>
<td>Amount of substance</td>
<td>$n$</td>
<td>mole*h</td>
<td>mol</td>
<td>1971*b</td>
</tr>
<tr>
<td>Luminous intensity</td>
<td>$I_v$</td>
<td>candela*i</td>
<td>cd</td>
<td>1979*b</td>
</tr>
</tbody>
</table>

*a Length of the path travelled in vacuum during $1/299792458$ s.

*b CGPM—Conférence générale des poids et mesures.

c Mass of the international prototype of the kilogram.

The 3rd CGPM (1901) explicitly stated: “The kilogram is the unit of mass”.

d The definition follows from $\nu = 9192631770$ Hz for the hyperfine splitting of the ground state of a $^{133}$Cs atom at rest and at 0 K. The definition of the second should be understood as the definition of the unit of proper time. It is wrong to correct for the local gravitational field (SI Brochure Appendix 2). The temps atomique international (TAI) is based on this second. Civil (legal) times are related to the coordinated Universal Time (UTC) derived from TAI by leap seconds.

e The definition follows from $\mu_0 = 4 \pi \times 10^{-7}$ H/m (exact) for the permeability of free space.

f CIPM—Comité international des poids et mesures.

g The triple point of water is exactly at 273.16 K.

h The molar mass of $^{12}$C is exactly 12 g/mol.

i Radiant intensity of $1/683$ W sr$^{-1}$ emitted in a certain direction at a frequency of $\nu = 540 \times 10^{12}$ Hz.

modified by any indices etc. However, SI prefixes (see Table 41.1) can and should be added (as required) to the unit symbols. In the case of the mass unit, prefixes are applied to “g” and not to the base unit “kg” (cf., Table 41.2) with definitions of the SI base units; in addition, many quantities have special unit symbols).

** Unit symbols can be treated as mathematical entities, for which multiplication
and division rules apply, e.g., \( t/\circ C = T/K - 273.15 \) defines the relationship between the thermodynamic and Celsius temperature scales (where 273.15 K is the ice point of water). This is also useful for labelling coordinate axes of diagrams or columns of tables, e.g., “Temperature, \( T/K \)” . It produces the numbers that are actually plotted or listed.

** This concept is required for logarithmic expressions, such as \( \lg(T/K) = 5 \), as a logarithm cannot be defined for physical quantities.

— Unit symbols cannot stand alone.

* Thus it should read, for instance: “a temperature of a few millikelvins” — and not “a few mK”.

** The names of units are written in lower case, even if they are derived from proper names, but then the corresponding unit symbols are capitalized (cf., Table 41.2).

** Unit symbols and prefixes are written in roman style.

** There must be a space between the number and the unit symbol of a physical quantity (e.g., \( P = 1 \text{ W} \) ), except for the plane angle units degree, minute and second in expression like \( 1 \circ = 60' = 3600'' \) or \( \alpha = 5 \circ 40'30'' \) . There must also be a space between successive unit symbols. For instance, \( 1 \text{ m s}^{-1} \) is totally different from \( 1 \text{ ms}^{-1} \). It looks, in general, nicer if the second space and later ones are written as narrow spaces.

* The non-decimal angular units, degrees, minutes and seconds, are outside SI, but are accepted for use with SI. The SI unit name for plane angles is “radian”: \( 1 \text{ rad} = 1 \text{ m/m} = 1 \), and the name for solid angles is “steradian”: \( 1 \text{ sr} = 1 \text{ m}^2/\text{m}^2 = 1 \).

** The symbol “%” represents the number 0.01. Thus it should read, for instance, the “relative increase” of the power, \( P \), is 10 % or the “fractional abundance” of the element is 10 %. It must always be clearly stated which dimensionless quantity is meant.

* The following non-SI unit symbols (and some others) are also accepted:

\[
1 \text{ d} = 24 \text{ h} = 1440 \text{ min} (= 86400 \text{ s}); 1 \text{ eV} (= 1.602176565(35) \times 10^{-19} \text{ J}); 1 \text{ ua, the astronomical unit}^2, \text{l’unité astronomique} (= 1.49597870691(6) \times 10^{11} \text{ m}).
\]

Also accepted are \( 1 \text{ mas} = 0.001'' \) and \( 1 \text{ µas} = 0.000001'' \).

* Equations should preferably be written between quantities and not between numerical values. In any case, the equations must be correct in their dimensions.

— More than one solidus (“/”) is not permitted in a single expression, unless parentheses are used.

The non-SI unit \( 1 \text{ a} = 100 \text{ m}^2 \) defined in 1879 is still in use, but in the tables of this book the convention is that \( 1 \text{ a} \) will be the length of time of a (tropical) year.

* Although \( 1 \text{ Å}, 1 \text{ mA}, \text{ etc.} \) are acceptable, we tried to avoid them as much as possible.

— In any case, SI unit symbols of a certain quantity should not be mixed with non-SI symbols in one chapter.

* If, for special reasons, non-SI units have to be used, an explicit definition in terms of SI units is required in principle, e.g., \( W = 1 \times 10^7 \text{ erg} (= 1 \text{ J}) \), when employing the centimetre-gram-second (CGS) system. In order to avoid too many

\(^2\text{The International Astronomical Union (IAU) decided to fix the astronomical unit (AU) at 149,597,870,700 m during its Beijing meeting in August 2012. The decision was based on a proposal by Pitjeva and Standish (2009).}\)
repetitions of such definitions, the most common deviations from SI are compiled in Table 41.3.

** Equations and relations:**

* Approximately: \( \approx \); proportional: \( \sim \) or better \( \propto \).

** The differential symbol, “d” is written in roman style, i.e.,

\[
\frac{d \exp(x)}{dx} = e^x \quad \text{and} \quad \int \cos x \, dx = \sin x.
\]

** General:**

** Differentiate between “radiance” for measurements with spatial resolution and “intensity” without spatial resolution (cf., Table 41.4).

* In the context of radiometry the quantity to describe a detector response is called “responsivity” and should be preferred over the much more general expression “sensitivity”.

— A prefix cannot stand alone, nor can it be combined with another prefix (cf., Table 41.1).

** The decimal marker is a point on the line in publications in English.

— No comma is inserted between groups of three digits,

* but a small space can be introduced (as in 11222.33344455).

** In the context of calibrated measurements an uncertainty definition is required. The distinction between “accuracy” and “precision” should be kept in mind. Precision is related to an inherent consistency of a data set, whereas accuracy refers back to a standard. The standard uncertainty (i.e., the estimated standard deviation) has a coverage factor of \( k = 1 \) (1 \( \sigma \) in old, but still acceptable, notation) and is denoted by \( u \). Uncertainties can also be given with \( k = 2 \) (2 \( \sigma \)) or \( k = 3 \) (3 \( \sigma \), as required, but this has to be indicated (conveniently by \( U = k u \); \( k = 2, 3, \ldots \)).

As an example, the Newtonian constant of gravitation, \( G \), will be considered: after 2010 CODATA (Committee on Data for Science and Technology) it is

\[
G = \left(6.673 \; 84(80) \times 10^{-11}\right) \; \text{m}^3\text{kg}^{-1}\text{s}^{-2}, \text{ which is equivalent to } G = \left(6.673 \; 84 \pm 0.00084\right) \times 10^{-11} \; \text{m}^3\text{kg}^{-1}\text{s}^{-2}\;
\]

or \( u(G) = 8.0 \times 10^{-15} \; \text{m}^3\text{kg}^{-1}\text{s}^{-2} \), see also Mohr et al. (2008).

The same information can be conveyed in the form of a relative uncertainty

\[
u_r(G) = u(G)/G = 0.00012 = 0.012 \% \quad \text{or} \quad U_r(G) = 0.024 \%; \quad k = 2.
\]

Contrary to many statements in the literature, an accuracy and not a precision is defined by the relative standard uncertainty.
Table 41.4: Examples of physical quantities without special unit symbols

<table>
<thead>
<tr>
<th>Quantity and symbol</th>
<th>Unit name</th>
<th>Unit symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat flux density(^a), irradiance, (E)</td>
<td>watt per square metre</td>
<td>W m(^{-2})</td>
</tr>
<tr>
<td>Energy density(^b), (w)</td>
<td>joule per cubic metre</td>
<td>J/m(^3) or J m(^{-3})</td>
</tr>
<tr>
<td>Radiance, (L)</td>
<td>watt per square metre and steradian</td>
<td>W m(^{-2}) sr(^{-1})</td>
</tr>
<tr>
<td>Spectral radiance, (L_{\lambda})</td>
<td>watt per square metre, steradian, and metre</td>
<td>W m(^{-2}) sr(^{-1}) m(^{-1})</td>
</tr>
<tr>
<td>Radiant intensity, (I)</td>
<td>watt per steradian</td>
<td>W sr(^{-1})</td>
</tr>
</tbody>
</table>

\(^a\) In the official French document: flux thermique surfacique; \(^b\) energie volumique.

* In order to assign lines to the spectrum of a given element and ionisation stage, one uses the convention that the spectrum of an atom (e.g., carbon) is called C\(1\), the first spectrum of the element. The singly-charged carbon ion, C\(^+\), emits the C\(1\) spectrum, etc. A spectral line is identified by the spectrum and its wavelength. Astronomers use brackets to indicate that a line belongs to a forbidden transition (usually involving a quadrupole rather than a dipole transition); thus one may speak of a [S\(iv\)] line at 10.5 \(\mu\)m.

**Final remark**

The nature of this publication, with many figures and diagrams taken from the literature, unfortunately but necessarily led to many deviations from SI rules since it is impractical to redraw existing figures. Nevertheless, the editors want to stress that SI defines the rules of the future, and must be respected as far as possible under given circumstances. Common usage within a discipline in the past is certainly not a sufficient justification for ignoring SI rules.

**References**

List of missions and acronyms

Missions ...........
ACE ............... Advanced Composition Explorer
AGILE ............. Astro-rivelatore Gamma a Immagini Leggero, Italian high-energy astrophysics mission
AKARI ............. Japanese space mission for infrared astronomy, formerly Astro-F
ASCE .............. Advanced Spectroscopic and Coronagraphic Explorer
Aura ................ NASA mission for atmospheric physics
AXAF .............. Advanced X-ray Astrophysics Facility, now Chandra
BeppoSAX .......... Italian-Dutch satellite for X-ray astronomy
Cassini .......... NASA mission to Saturn
CGRO .............. Compton Gamma-Ray Observatory
Chandra ........... X-ray observatory, formerly AXAF
CHASE .......... Coronal Helium Abundance Spacelab Experiment
COBE .......... Cosmic Background Explorer
CorE .......... Cosmic Origins Explorer
CORONAS ........ Complex Orbital Near-Earth Observations of the Solar Activity
COROT .......... Convection, Rotation and planetary Transits
CubeSat .......... Series of mini-satellites (10 cm per side) for educational purposes
DART .......... Demonstration for Autonomous Rendezvous Technology
ERS-1/2 .......... Earth Remote Sensing satellites
EURECA .......... European Retrievable Carrier
EUVE .............. Extreme Ultraviolet Explorer
EXOSAT .......... European X-ray Observatory Satellite
Fermi ............. Gamma-ray Space Telescope, formerly GLAST
FIRI .......... Far Infrared Interferometer
FUSE .......... Far-Ultraviolet Spectroscopic Explorer
GALEX .......... Galaxy Evolution Explorer
GEMS .......... Gravity and Extreme Magnetism Small Explorer
GLAST .......... Gamma-ray Space Telescope, now Fermi
GOCE .......... Gravity field and steady-state Ocean Circulation Explorer
GOES .......... Geostationary Orbiting Earth Satellite
GRACE .......... Gravity Recovery and Climate Experiment
GRAIL .......... Gravity Recovery And Interior Laboratory
GRANAT .......... Russian X-ray satellite
GRIPS .......... Gamma-Ray Imaging, Polarimetry and Spectroscopy mission
GRI .......... Gamma-Ray Imager
HALCA .......... Highly Advanced Laboratory for Communications and Astronomy
HEAO .......... High Energy Astronomy Observatories
<table>
<thead>
<tr>
<th>Acronyms</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HETE</strong></td>
<td>High Energy Transient Explorer</td>
</tr>
<tr>
<td><strong>Hinode</strong></td>
<td>Solar observatory, formerly <em>Solar-B</em></td>
</tr>
<tr>
<td><strong>Hipparcos</strong></td>
<td>High Precision Parallax Collecting Satellite</td>
</tr>
<tr>
<td><strong>HSM</strong></td>
<td><em>HST</em> Servicing Mission</td>
</tr>
<tr>
<td><strong>HST</strong></td>
<td><em>Hubble</em> Space Telescope</td>
</tr>
<tr>
<td><strong>IMAGE</strong></td>
<td>Imager for Magnetopause-to-Aurora Global Exploration</td>
</tr>
<tr>
<td><strong>IMP</strong></td>
<td>Interplanetary Monitoring Platform</td>
</tr>
<tr>
<td><strong>INTEGRAL</strong></td>
<td>International Gamma-Ray Astrophysics Laboratory</td>
</tr>
<tr>
<td><strong>IRAS</strong></td>
<td>Infrared Astronomy Satellite</td>
</tr>
<tr>
<td><strong>IRIS</strong></td>
<td>Interface Region Imaging Spectrograph</td>
</tr>
<tr>
<td><strong>IRTS</strong></td>
<td>Infrared Telescope in Space</td>
</tr>
<tr>
<td><strong>ISEE</strong></td>
<td>International Sun Earth Explorer</td>
</tr>
<tr>
<td><strong>ISO</strong></td>
<td>Infrared Space Observatory</td>
</tr>
<tr>
<td><strong>ISS</strong></td>
<td>International Space Station</td>
</tr>
<tr>
<td><strong>IUE</strong></td>
<td>International Ultraviolet Explorer</td>
</tr>
<tr>
<td><strong>IXO</strong></td>
<td>International X-ray Observatory</td>
</tr>
<tr>
<td><strong>JWST</strong></td>
<td>James Webb Space Telescope</td>
</tr>
<tr>
<td><strong>LISA</strong></td>
<td>Laser Interferometer Space Antenna</td>
</tr>
<tr>
<td><strong>Magellan</strong></td>
<td>NASA mission to Venus</td>
</tr>
<tr>
<td><strong>MIDEX</strong></td>
<td>Medium-class Explorer Mission</td>
</tr>
<tr>
<td><strong>MSG</strong></td>
<td><em>Meteosat</em> Second Generation</td>
</tr>
<tr>
<td><strong>MSX</strong></td>
<td>Midcourse Space Experiment</td>
</tr>
<tr>
<td><strong>NuSTAR</strong></td>
<td>Nuclear Spectroscopic Telescope Array</td>
</tr>
<tr>
<td><strong>OAO</strong></td>
<td>Orbiting Astronomical Observatory</td>
</tr>
<tr>
<td><strong>OSO</strong></td>
<td>Orbiting Solar Observatory</td>
</tr>
<tr>
<td><strong>Proba</strong></td>
<td>Project for On-Board Autonomy</td>
</tr>
<tr>
<td><strong>RHESSI</strong></td>
<td>Reuven Ramaty High Energy Solar Spectroscopic Imager</td>
</tr>
<tr>
<td><strong>ROSAT</strong></td>
<td>Röntgensatellit</td>
</tr>
<tr>
<td><strong>RXTE</strong></td>
<td>Rossi X-ray Timing Explorer</td>
</tr>
<tr>
<td><strong>SAS</strong></td>
<td>Small Astronomy Satellite</td>
</tr>
<tr>
<td><strong>SDO</strong></td>
<td>Solar Dynamics Observatory</td>
</tr>
<tr>
<td><strong>SFU</strong></td>
<td>Space Flyer Unit</td>
</tr>
<tr>
<td><strong>SIM</strong></td>
<td>Space Interferometry Mission, <em>SIM PlanetQuest</em></td>
</tr>
<tr>
<td><strong>SIRTF</strong></td>
<td>Space Infrared Telescope Facility, now <em>Spitzer</em></td>
</tr>
<tr>
<td><strong>SMART</strong></td>
<td>Small Missions for Advanced Research in Technology</td>
</tr>
<tr>
<td><strong>SMEX</strong></td>
<td>Small Explorer Mission</td>
</tr>
<tr>
<td><strong>SMM</strong></td>
<td>Solar Maximum Mission</td>
</tr>
<tr>
<td><strong>SNAP</strong></td>
<td>Supernova Acceleration Probe</td>
</tr>
<tr>
<td><strong>SOHO</strong></td>
<td>Solar and Heliospheric Observatory</td>
</tr>
<tr>
<td><strong>SORCE</strong></td>
<td>Solar Radiation and Climate Experiment</td>
</tr>
<tr>
<td><strong>Spacelab</strong></td>
<td>Laboratory for use on <em>Space Shuttle</em> flights</td>
</tr>
<tr>
<td><strong>SPARTAN</strong></td>
<td><em>Shuttle</em>-launched satellites for solar studies</td>
</tr>
<tr>
<td><strong>SPECS</strong></td>
<td>Submillimeter Probe of the Evolution of Cosmic Structure</td>
</tr>
<tr>
<td><strong>SPIRICA</strong></td>
<td>Space Infrared telescope for Cosmology and Astrophysics</td>
</tr>
<tr>
<td><strong>SPIRIT</strong></td>
<td>Space Infrared Interferometric Telescope</td>
</tr>
<tr>
<td><strong>Spitzer</strong></td>
<td>Space Infrared Telescope Facility, formerly <em>SIRTF</em></td>
</tr>
<tr>
<td><strong>SRG</strong></td>
<td>Spectrum-Röntgen-Gamma</td>
</tr>
</tbody>
</table>
**STEREO** ........ Solar Terrestrial Relations Observatory  
**STS** ............ Space Transportation System  
**Suzaku** .......... Japanese X-ray astronomy mission, formerly *Astro-E2*  
**SWAS** .......... Submillimeter Wave Astronomy Satellite  
**Swift** .......... NASA Gamma-Ray Burst Mission  
**TDRSS** .......... Tracking and Data Relay Satellite System  
**TIMED** .......... Thermosphere, Ionosphere and Mesosphere Energetics and Dynamics mission  
**TOPEX** .......... Topology Ocean Experiment  
**TRACE** .......... Transition Region and Coronal Explorer  
**TSRSS** .......... Tracking and Data Relay Satellite System  
**UARS** .......... Upper Atmosphere Research Satellite  
**WIRE** .......... Wide Field Infrared Explorer  
**WMAP** .......... Wilkinson Microwave Anisotropy Probe  
**XEUS** .......... X-Ray Evolving Universe Spectroscopy Mission  
**XMM-Newton** .... X-ray Multi-Mirror Mission  
**Yohkoh** .......... Solar X-ray observatory

**General** ........  
AAE ............. Absolute attitude error  
AAME .......... Absolute attitude measurement error  
AAS ............. Absolute attitude stability  
AC ............... Autocorrelator and alternating current  
ACBAR .......... Arcminute Cosmology Bolometer Array Receiver  
ACRIM .......... Active Cavity Radiometer Irradiance Monitor  
ACS .............. Advanced Camera for Surveys  
ADC ............. Analogue-to-digital converter  
ADR ............. Adiabatic demagnetization refrigerator  
ADS .............. Astrophysics Data System  
AFB .............. Airforce base  
AGC ............. Automatic gain control  
AGN ............. Active galactic nucleus  
AIA .............. Atmospheric Imaging Assembly  
AIV .......... Assembly, integration and verification  
AKR .......... (Terrestrial) auroral kilometric radiation  
ALMA .......... Atacama Large Millimeter/submillimeter Array  
AMR .......... Advanced Microwave Radiometer  
AO ............... Adaptive optics  
AOS ............. Acousto-optical spectrometer  
APEX .......... Atacama Pathfinder Experiment  
APS .......... Active pixel sensor  
AR .......... Active region and anti-reflective  
ASAR .......... Advanced Synthetic Aperture Radar  
ASI .......... Agenzia Spaziale Italiana  
ASIC .......... Application specific integrated circuit  
ATM .......... Apollo Telescope Mount  
BAT .......... Burst Alert Telescope
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BATSE</td>
<td>Burst And Transient Source Experiment</td>
</tr>
<tr>
<td>BCS</td>
<td>Bragg Crystal Spectrometer and bent crystal spectrometer</td>
</tr>
<tr>
<td>BGO</td>
<td>Bismuth germanate, $\text{Bi}_4\text{Ge}<em>3\text{O}</em>{12}$</td>
</tr>
<tr>
<td>BIB</td>
<td>Blocked impurity band</td>
</tr>
<tr>
<td>BICEP</td>
<td>Background Imaging of Cosmic Extragalactic Polarization</td>
</tr>
<tr>
<td>BIPM</td>
<td>Bureau International des Poids et Mesures</td>
</tr>
<tr>
<td>BLAST</td>
<td>Balloon-borne Large-Aperture Submillimetre Telescope</td>
</tr>
<tr>
<td>BMDO</td>
<td>Ballistic Missile Defense Organization</td>
</tr>
<tr>
<td>BOLD</td>
<td>Blind to optical light detector</td>
</tr>
<tr>
<td>BRAIN</td>
<td>B-mode Radiation Interferometer</td>
</tr>
<tr>
<td>BUSS</td>
<td>Balloon-borne Ultraviolet Stellar Spectrograph</td>
</tr>
<tr>
<td>cBN</td>
<td>Cubic BN, cubic boron nitride</td>
</tr>
<tr>
<td>CCD</td>
<td>Charge-coupled device</td>
</tr>
<tr>
<td>CDS</td>
<td>Coronal Diagnostic Spectrometer</td>
</tr>
<tr>
<td>CEM</td>
<td>Channel electron multiplier</td>
</tr>
<tr>
<td>CERN</td>
<td>Conseil Européen pour la Recherche Nucléaire</td>
</tr>
<tr>
<td>CFC</td>
<td>Chlorofluorocarbon</td>
</tr>
<tr>
<td>CFRP</td>
<td>Carbon fibre reinforced plastic</td>
</tr>
<tr>
<td>CG</td>
<td>Centre of gravity</td>
</tr>
<tr>
<td>CHASE</td>
<td>Coronal Helium Abundance Spacelab Experiment</td>
</tr>
<tr>
<td>CHIANTI</td>
<td>An atomic database for spectroscopic diagnostics of astrophysical plasmas</td>
</tr>
<tr>
<td>CID</td>
<td>Charge induction device</td>
</tr>
<tr>
<td>CIRS</td>
<td>Composite Infrared Spectrometer</td>
</tr>
<tr>
<td>CLOVER</td>
<td>Ground-based telescope to detect the imprint of inflationary gravity waves on the polarisation of the CMB</td>
</tr>
<tr>
<td>CMA</td>
<td>Channel multiplier array</td>
</tr>
<tr>
<td>CMB</td>
<td>Cosmic Microwave Background</td>
</tr>
<tr>
<td>CME</td>
<td>Coronal mass ejection</td>
</tr>
<tr>
<td>CMOS</td>
<td>Complementary metal oxide superconductor</td>
</tr>
<tr>
<td>CNES</td>
<td>Centre National d’Etudes Spatiales</td>
</tr>
<tr>
<td>CNM</td>
<td>Cold neutral medium</td>
</tr>
<tr>
<td>CNRS</td>
<td>Centre National de la Recherche Scientifique</td>
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<tr>
<td>CODACON</td>
<td>Coded anode converter</td>
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<tr>
<td>COMPTEL</td>
<td>Imaging Compton Telescope</td>
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<tr>
<td>COS</td>
<td>Cosmic Origins Spectrograph</td>
</tr>
<tr>
<td>COSPAR</td>
<td>Committee on Space Research</td>
</tr>
<tr>
<td>COSTAR</td>
<td>Corrective Optics Space Telescope Axial Replacement</td>
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<tr>
<td>CSIRO</td>
<td>Commonwealth Scientific and Industrial Research Organisation, Australia</td>
</tr>
<tr>
<td>CTE</td>
<td>Charge transfer efficiency and thermal expansion coefficient</td>
</tr>
<tr>
<td>CTI</td>
<td>Charge transfer inefficiency</td>
</tr>
<tr>
<td>CTIA</td>
<td>Capacitive transimpedance amplifier</td>
</tr>
<tr>
<td>CVD</td>
<td>Chemical vapour deposition</td>
</tr>
<tr>
<td>CZT</td>
<td>Cadmium zinc telluride ($\text{Cd}_{1-x}\text{Zn}_x\text{Te}$)</td>
</tr>
<tr>
<td>DARPA</td>
<td>Defense Advanced Research Project Agency</td>
</tr>
<tr>
<td>DASI</td>
<td>Degree Angular Scale Interferometer</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>DC</td>
<td>Direkt current</td>
</tr>
<tr>
<td>DDL</td>
<td>Double-delay line</td>
</tr>
<tr>
<td>DECT</td>
<td>Digital enhanced cordless telecommunications</td>
</tr>
<tr>
<td>DEM</td>
<td>Differential emission measure</td>
</tr>
<tr>
<td>DF</td>
<td>Dielectric filter</td>
</tr>
<tr>
<td>DIRBE</td>
<td>Diffuse Infrared Background Experiment</td>
</tr>
<tr>
<td>DLR</td>
<td>Deutsches Luft- und Raumfahrtzentrum</td>
</tr>
<tr>
<td>DMR</td>
<td>Differential Microwave Radiometer</td>
</tr>
<tr>
<td>DORIS</td>
<td>Doppler Orbitography and Radio-positioning Integrated by Satellite</td>
</tr>
<tr>
<td>DPU</td>
<td>Data processing unit</td>
</tr>
<tr>
<td>DQE</td>
<td>Detective quantum efficiency</td>
</tr>
<tr>
<td>DROID</td>
<td>Distributed read-out imaging device</td>
</tr>
<tr>
<td>DRT</td>
<td>Decoupled ring technique</td>
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<tr>
<td>EBIT</td>
<td>Electron Beam Ion Trap (facility, LLNL)</td>
</tr>
<tr>
<td>EBS</td>
<td>Electron-bombarded silicon</td>
</tr>
<tr>
<td>ECR</td>
<td>Electrically calibrated radiometer</td>
</tr>
<tr>
<td>ECS</td>
<td>EBIT calorimeter spectrometer</td>
</tr>
<tr>
<td>EE</td>
<td>Encircled energy</td>
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<tr>
<td>EGRET</td>
<td>Energetic Gamma Ray Experiment Telescope</td>
</tr>
<tr>
<td>EGS</td>
<td>Extreme-ultraviolet Grating Spectrograph</td>
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<tr>
<td>EIS</td>
<td>EUV Imaging Spectrometer</td>
</tr>
<tr>
<td>EISM</td>
<td>Equal index solid Michelson (interferometer)</td>
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<tr>
<td>EIT</td>
<td>Extreme-ultraviolet Imaging Telescope</td>
</tr>
<tr>
<td>EM</td>
<td>Emission measure</td>
</tr>
<tr>
<td>EOF</td>
<td>Experimenters’ operation facility</td>
</tr>
<tr>
<td>EPIC</td>
<td>European Photon Imaging Camera</td>
</tr>
<tr>
<td>ePSF</td>
<td>Effective PSF</td>
</tr>
<tr>
<td>ESA</td>
<td>European Space Agency</td>
</tr>
<tr>
<td>ESRO</td>
<td>European Space Research Organisation, now part of ESA</td>
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<tr>
<td>ESTEC</td>
<td>European Space Research and Technology Centre, ESA</td>
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<tr>
<td>ETH</td>
<td>Eidgenössische Technische Hochschule, Zürich</td>
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<tr>
<td>EUNIS</td>
<td>(Solar) EUV Normal-Incidence Spectrometer</td>
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<tr>
<td>EUV</td>
<td>Extreme ultraviolet</td>
</tr>
<tr>
<td>EUVI</td>
<td>EUV Imager</td>
</tr>
<tr>
<td>FEEP</td>
<td>Field emission electric propulsion</td>
</tr>
<tr>
<td>FFT</td>
<td>Fast Fourier transform</td>
</tr>
<tr>
<td>FIFI</td>
<td>Far Infrared Imaging Fabry–Perot Interferometer</td>
</tr>
<tr>
<td>FILM</td>
<td>Far-Infrared Line Mapper</td>
</tr>
<tr>
<td>FIP</td>
<td>First-ionization potential</td>
</tr>
<tr>
<td>FIR</td>
<td>Far infrared</td>
</tr>
<tr>
<td>FIRAS</td>
<td>Far Infrared Absolute Spectrophotometer</td>
</tr>
<tr>
<td>FIRP</td>
<td>Far IR Photometer</td>
</tr>
<tr>
<td>FIS</td>
<td>Far Infrared Surveyor</td>
</tr>
<tr>
<td>FOC</td>
<td>Faint Object Camera</td>
</tr>
<tr>
<td>FOT</td>
<td>Flight operations team</td>
</tr>
<tr>
<td>FOV</td>
<td>Field of view</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
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</tr>
<tr>
<td>FP</td>
<td>Fabry–Perot</td>
</tr>
<tr>
<td>FPA</td>
<td>Focal plane array</td>
</tr>
<tr>
<td>FPGA</td>
<td>Field programmable gate array</td>
</tr>
<tr>
<td>FPI</td>
<td>Fabry–Perot interferometer</td>
</tr>
<tr>
<td>FTS</td>
<td>Fourier transform spectrometer</td>
</tr>
<tr>
<td>FUSEP</td>
<td>Far-Ultraviolet Spectropolarimeter</td>
</tr>
<tr>
<td>FUV</td>
<td>Far ultraviolet</td>
</tr>
<tr>
<td>FWHM</td>
<td>Full width at half maximum</td>
</tr>
<tr>
<td>GEANT</td>
<td>Geometry and Tracking</td>
</tr>
<tr>
<td>GEM</td>
<td>Gas electron multiplier</td>
</tr>
<tr>
<td>GEO</td>
<td>Geosynchronous orbit</td>
</tr>
<tr>
<td>GEC</td>
<td>Galileo Electro-Optics Corporation</td>
</tr>
<tr>
<td>GFRP</td>
<td>Glass fibre reinforced plastic</td>
</tr>
<tr>
<td>GHRS</td>
<td>Goddard High Resolution Spectrograph</td>
</tr>
<tr>
<td>GI</td>
<td>Grazing incidence</td>
</tr>
<tr>
<td>GMES</td>
<td>Global Monitoring for Environmental Security</td>
</tr>
<tr>
<td>GP</td>
<td>Goniopolarimetry</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>GPSP</td>
<td>Global Positioning System Payload</td>
</tr>
<tr>
<td>GRAPE</td>
<td>Gamma Ray Polarimeter Experiment</td>
</tr>
<tr>
<td>GRB</td>
<td>Gamma ray burst</td>
</tr>
<tr>
<td>GSFC</td>
<td>Goddard Space Flight Center</td>
</tr>
<tr>
<td>GSO</td>
<td>Gadolinium orthosilicate, Gd$_2$SiO$_5$</td>
</tr>
<tr>
<td>GTO</td>
<td>Geosynchronous transfer orbit</td>
</tr>
<tr>
<td>HAWC</td>
<td>High-resolution Airborne Wideband Camera</td>
</tr>
<tr>
<td>HCO</td>
<td>Harvard College Observatory</td>
</tr>
<tr>
<td>HEB</td>
<td>Hot electron bolometer</td>
</tr>
<tr>
<td>HEFT</td>
<td>High Energy Focusing Telescope</td>
</tr>
<tr>
<td>HEMT</td>
<td>High Electron Mobility Transistor</td>
</tr>
<tr>
<td>HEO</td>
<td>Highly eccentric orbit</td>
</tr>
<tr>
<td>HEP</td>
<td>High-efficiency particle air (filter)</td>
</tr>
<tr>
<td>HESS</td>
<td>High Energy Stereoscopic System</td>
</tr>
<tr>
<td>HEXTE</td>
<td>High-Energy X-ray Timing Experiment</td>
</tr>
<tr>
<td>HFI</td>
<td>High Frequency Instrument</td>
</tr>
<tr>
<td>HIFI</td>
<td>Heterodyne Instrument for the Far-Infrared</td>
</tr>
<tr>
<td>HMI</td>
<td>Helioseismic and Magnetic Imager for SDO</td>
</tr>
<tr>
<td>HPF</td>
<td>High-level Processing Facilities (ESA)</td>
</tr>
<tr>
<td>HRC</td>
<td>High Resolution Camera</td>
</tr>
<tr>
<td>HRDI</td>
<td>High Resolution Doppler Imager</td>
</tr>
<tr>
<td>HRI</td>
<td>High Resolution Imager</td>
</tr>
<tr>
<td>HRTS</td>
<td>High Resolution Telescope and Spectrograph</td>
</tr>
<tr>
<td>HV</td>
<td>High voltage</td>
</tr>
<tr>
<td>HXD</td>
<td>Hard X-ray Detector</td>
</tr>
<tr>
<td>IAF</td>
<td>International Astronautical Federation</td>
</tr>
<tr>
<td>IAU</td>
<td>International Astronomical Union</td>
</tr>
<tr>
<td>IAPS</td>
<td>Intensified active pixel sensor</td>
</tr>
<tr>
<td>IBIS</td>
<td>Imager on Board the INTEGRAL Spacecraft</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
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</tr>
<tr>
<td>ICCD</td>
<td>Intensified charge coupled device</td>
</tr>
<tr>
<td>IF</td>
<td>Intermediate frequency</td>
</tr>
<tr>
<td>IFU</td>
<td>Integral field unit</td>
</tr>
<tr>
<td>IMO</td>
<td>Inverted-mode operation</td>
</tr>
<tr>
<td>InSAR</td>
<td>Interferometric synthetic aperture radar</td>
</tr>
<tr>
<td>IP</td>
<td>Ionization potential</td>
</tr>
<tr>
<td>IPS</td>
<td>Instrument pointing system</td>
</tr>
<tr>
<td>IR</td>
<td>Infrared</td>
</tr>
<tr>
<td>IRAM</td>
<td>Institut de Radioastronomie Millimétrique</td>
</tr>
<tr>
<td>IRMB</td>
<td>Institut Royal Météorologique de Belgique</td>
</tr>
<tr>
<td>ISAS</td>
<td>Institute of Space and Astronautical Science, Japan</td>
</tr>
<tr>
<td>ISM</td>
<td>Interstellar Medium</td>
</tr>
<tr>
<td>ISOCAM</td>
<td>Camera on ISO</td>
</tr>
<tr>
<td>ISOPHOT</td>
<td>Imaging photo-polarimeter on ISO</td>
</tr>
<tr>
<td>ISRO</td>
<td>Indian Space Research Organisation</td>
</tr>
<tr>
<td>ISSI</td>
<td>International Space Science Institute</td>
</tr>
<tr>
<td>IXPS</td>
<td>Imaging X-ray Polarimeter for Solar Flares</td>
</tr>
<tr>
<td>J-PEX</td>
<td>Joint astrophysical Plasmadynamic Experiment</td>
</tr>
<tr>
<td>JAXA</td>
<td>Japan Aerospace Exploration Agency</td>
</tr>
<tr>
<td>JFET</td>
<td>Junction field effect transistors</td>
</tr>
<tr>
<td>JPL</td>
<td>Jet Propulsion Laboratory</td>
</tr>
<tr>
<td>KAO</td>
<td>Kuiper Airborne Observatory</td>
</tr>
<tr>
<td>KOG</td>
<td>Kilometric optical gyro</td>
</tr>
<tr>
<td>LASCO</td>
<td>Large Angle Spectroscopic Coronagraph</td>
</tr>
<tr>
<td>LASP</td>
<td>Laboratory for Atmospheric and Space Physics</td>
</tr>
<tr>
<td>LAT</td>
<td>Large Area Telescope</td>
</tr>
<tr>
<td>LEO</td>
<td>Low Earth orbit</td>
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<tr>
<td>LEP</td>
<td>Laboratoires d’Electronique et de Physique Appliquée</td>
</tr>
<tr>
<td>LESIA</td>
<td>Laboratoire d’études spatiales et d’instrumentation en astrophysique</td>
</tr>
<tr>
<td>LFI</td>
<td>Low Frequency Instrument</td>
</tr>
<tr>
<td>LLNL</td>
<td>Lawrence Livermore National Laboratory</td>
</tr>
<tr>
<td>LMSAL</td>
<td>Lockheed Martin Solar and Astrophysics Laboratory</td>
</tr>
<tr>
<td>LNA</td>
<td>Low-noise amplifier</td>
</tr>
<tr>
<td>LO</td>
<td>Local oscillator</td>
</tr>
<tr>
<td>LOS</td>
<td>Line of sight</td>
</tr>
<tr>
<td>LRA</td>
<td>Laser Retroreflector Array</td>
</tr>
<tr>
<td>LSF</td>
<td>Line spread function</td>
</tr>
<tr>
<td>LWIR</td>
<td>Long-wave IR</td>
</tr>
<tr>
<td>LWS</td>
<td>Long Wavelength Spectrometer</td>
</tr>
<tr>
<td>LYRA</td>
<td>Lyman Alpha Radiometer</td>
</tr>
<tr>
<td>MAGIC</td>
<td>Major Atmospheric Gamma Imaging Cherenkov telescope</td>
</tr>
<tr>
<td>MAMA</td>
<td>Multi-Anode Microchannel Array</td>
</tr>
<tr>
<td>MBE</td>
<td>Molecular beam epitaxy</td>
</tr>
<tr>
<td>MBI</td>
<td>Millimeter-Wave Bolometric Interferometer</td>
</tr>
<tr>
<td>MCP</td>
<td>Microchannel plate</td>
</tr>
<tr>
<td>MCS</td>
<td>Multi-channel spectrometer</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
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</tr>
<tr>
<td>MDI</td>
<td>Michelson Doppler Imager</td>
</tr>
<tr>
<td>MEGA</td>
<td>Medium Energy Gamma-Ray Astronomy experiment</td>
</tr>
<tr>
<td>MEM</td>
<td>Magnetic electron multiplier</td>
</tr>
<tr>
<td>MEMS</td>
<td>Micro-electro-mechanical systems</td>
</tr>
<tr>
<td>MI</td>
<td>Michelson interferometer</td>
</tr>
<tr>
<td>MIPS</td>
<td>Multiband Imaging Photometer for <em>Spitzer</em></td>
</tr>
<tr>
<td>MIR</td>
<td>Mid infrared</td>
</tr>
<tr>
<td>MIRI</td>
<td>Mid-Infrared Instrument</td>
</tr>
<tr>
<td>MIT</td>
<td>Massachusetts Institute of Technology</td>
</tr>
<tr>
<td>MKID</td>
<td>Microwave kinetic inductance detector</td>
</tr>
<tr>
<td>MLI</td>
<td>Multilayer insulation</td>
</tr>
<tr>
<td>MLS</td>
<td>Microwave Limb Sounder</td>
</tr>
<tr>
<td>MMC</td>
<td>Metallic magnetic calorimeter</td>
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<tr>
<td>MOSFET</td>
<td>Metal oxide semiconductor field-effect transistor</td>
</tr>
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<td>MIPS</td>
<td>Max-Planck-Institut für Sonnensystemforschung, formerly Max-Planck-Institut für Aeronomie (MPAE)</td>
</tr>
<tr>
<td>MSDP</td>
<td>Multi channel subtraction double pass</td>
</tr>
<tr>
<td>MSM</td>
<td>Metal-semiconductor-metal</td>
</tr>
<tr>
<td>MSSL</td>
<td>Mullard Space Science Laboratory</td>
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<tr>
<td>MSSTA</td>
<td>Multi-Spectral Solar Telescope Array</td>
</tr>
<tr>
<td>MUV</td>
<td>Medium ultraviolet</td>
</tr>
<tr>
<td>MWIR</td>
<td>Mid-wave MW</td>
</tr>
<tr>
<td>NASA</td>
<td>National Aeronautics and Space Administration (US)</td>
</tr>
<tr>
<td>NBS</td>
<td>National Bureau of Standards, now NIST</td>
</tr>
<tr>
<td>NCT</td>
<td>Nuclear Compton Telescope</td>
</tr>
<tr>
<td>NEP</td>
<td>Noise equivalent power</td>
</tr>
<tr>
<td>NETD</td>
<td>Noise equivalent temperature difference</td>
</tr>
<tr>
<td>NGC</td>
<td>New General Catalogue (of nebulae and clusters of stars)</td>
</tr>
<tr>
<td>NI</td>
<td>Normal incidence</td>
</tr>
<tr>
<td>NICMOS</td>
<td>Near Infrared Camera and Multi-Object Spectrometer</td>
</tr>
<tr>
<td>NIR</td>
<td>Near infrared</td>
</tr>
<tr>
<td>NIRSpec</td>
<td>Near infrared multiobject dispersive spectrograph to be flown on the <em>JWST</em></td>
</tr>
<tr>
<td>NIST</td>
<td>National Institute of Standards and Technology (US)</td>
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<tr>
<td>NIXT</td>
<td>Normal Incidence X-ray Telescope</td>
</tr>
<tr>
<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration (US)</td>
</tr>
<tr>
<td>NOAO</td>
<td>National Optical Astronomy Observatory</td>
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<td>NRL</td>
<td>Naval Research Laboratory (US)</td>
</tr>
<tr>
<td>NSF</td>
<td>National Science Foundation</td>
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<tr>
<td>NSSDC</td>
<td>National Space Science Data Center (US)</td>
</tr>
<tr>
<td>NTD</td>
<td>Neutron-transmutation-doped</td>
</tr>
<tr>
<td>NUV</td>
<td>Near ultraviolet</td>
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<tr>
<td>OIR</td>
<td>Optical infrared</td>
</tr>
<tr>
<td>OMT</td>
<td>Orthomode-transducer</td>
</tr>
<tr>
<td>Acronyms</td>
<td>Meaning</td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
</tr>
<tr>
<td>OPD</td>
<td>Optical path difference</td>
</tr>
<tr>
<td>OSC</td>
<td>Orbital Science Corporation</td>
</tr>
<tr>
<td>OSSE</td>
<td>Oriented Scintillation Spectrometer Experiment</td>
</tr>
<tr>
<td>PA</td>
<td>Power amplifier</td>
</tr>
<tr>
<td>PACS</td>
<td>Photodetector Array Camera and Spectrometer for <em>Herschel</em></td>
</tr>
<tr>
<td>PAH</td>
<td>Polycyclic aromatic hydrocarbon</td>
</tr>
<tr>
<td>PDF</td>
<td>Probability density function</td>
</tr>
<tr>
<td>PDR</td>
<td>Photodissociation region</td>
</tr>
<tr>
<td>PEM</td>
<td>Piezoelectric modulator</td>
</tr>
<tr>
<td>PFO</td>
<td>Particle fall out</td>
</tr>
<tr>
<td>PHOTICON</td>
<td>Resistive anode encoder (with special photocathodes)</td>
</tr>
<tr>
<td>PI</td>
<td>Proportional-integral</td>
</tr>
<tr>
<td>PIN</td>
<td>p-type/intrinsic/n-type semiconductor (diode)</td>
</tr>
<tr>
<td>PIXIE</td>
<td>Pixel Imaging Experiment, now POLARIX</td>
</tr>
<tr>
<td>PMOD/WRC</td>
<td>Physikalisch-Meteorologisches Observatorium Davos / World Radiation Center</td>
</tr>
<tr>
<td>PMT</td>
<td>Photo-multiplier tube</td>
</tr>
<tr>
<td>PoGO</td>
<td>Polarized Gamma-ray Observer</td>
</tr>
<tr>
<td>POLAR</td>
<td>Space-borne hard X-ray polarimeter dedicated to the polarisation measurement of GRBs</td>
</tr>
<tr>
<td>POLRAD</td>
<td>Experiment to measure power spectra and polarisation of the auroral kilometric radiation (AKR)</td>
</tr>
<tr>
<td>PSB</td>
<td>Polarization-Sensitive Bolometer</td>
</tr>
<tr>
<td>PSD</td>
<td>Phase-sensitive detector</td>
</tr>
<tr>
<td>PSF</td>
<td>Point spread function</td>
</tr>
<tr>
<td>PSI</td>
<td>Paul Scherrer Institut</td>
</tr>
<tr>
<td>QCL</td>
<td>Quantum-cascade laser</td>
</tr>
<tr>
<td>QCM</td>
<td>Quartz crystal micro balance</td>
</tr>
<tr>
<td>QE</td>
<td>Quantum efficiency</td>
</tr>
<tr>
<td>QP</td>
<td>Quasi-particle</td>
</tr>
<tr>
<td>QuAD</td>
<td>Quest At DASI</td>
</tr>
<tr>
<td>QUIET</td>
<td>Q/U Imaging Experiment</td>
</tr>
<tr>
<td>RAE</td>
<td>Resistive anode encoder and relative attitude error</td>
</tr>
<tr>
<td>RAISE</td>
<td>Rapid Acquisition Imaging Spectrograph</td>
</tr>
<tr>
<td>RAL</td>
<td>Rutherford Appleton Laboratory</td>
</tr>
<tr>
<td>RAME</td>
<td>Relative attitude measurement error</td>
</tr>
<tr>
<td>RANICON</td>
<td>Resistive anode encoder</td>
</tr>
<tr>
<td>RAS</td>
<td>Relative attitude stability</td>
</tr>
<tr>
<td>RDE</td>
<td>Relative displacement error</td>
</tr>
<tr>
<td>RDME</td>
<td>Relative displacement measurement error</td>
</tr>
<tr>
<td>RDS</td>
<td>Relative displacement stability</td>
</tr>
<tr>
<td>RESIK</td>
<td>Rentgenovsky Spektrometr s Izognutymi Kristalami</td>
</tr>
<tr>
<td>RGA</td>
<td>Residual gas analyzer</td>
</tr>
<tr>
<td>RGS</td>
<td>Reflection Grating Spectrometer</td>
</tr>
<tr>
<td>RMC</td>
<td>Rotation Modulation Collimator</td>
</tr>
<tr>
<td>RMS</td>
<td>Root mean square</td>
</tr>
<tr>
<td>ROIC</td>
<td>Readout integrated circuit</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>RTG</td>
<td>Radioisotope thermoelectric generators</td>
</tr>
<tr>
<td>RTS</td>
<td>Random telegraph signal</td>
</tr>
<tr>
<td>SAA</td>
<td>South Atlantic Anomaly</td>
</tr>
<tr>
<td>SAFARI</td>
<td><em>SPICA</em> Far-infrared Instrument</td>
</tr>
<tr>
<td>SAFIRE</td>
<td>Submillimeter and Far-Infrared Experiment</td>
</tr>
<tr>
<td>SAO</td>
<td>Smithsonian Astrophysical Observatory</td>
</tr>
<tr>
<td>SAR</td>
<td>Synthetic aperture radar</td>
</tr>
<tr>
<td>SBI</td>
<td>Solar Bolometric Imager</td>
</tr>
<tr>
<td>SCD</td>
<td>Swept charge device</td>
</tr>
<tr>
<td>SCIAMACHY</td>
<td>Scanning Imaging Absorption Spectrometer for Atmospheric Chartography</td>
</tr>
<tr>
<td>SDD</td>
<td>Silicon drift detector</td>
</tr>
<tr>
<td>SEC</td>
<td>Secondary Electron Conduction, method of intensifying in image tubes</td>
</tr>
<tr>
<td>SECCHI</td>
<td>Sun Earth Connection Coronal and Heliospheric Investigation</td>
</tr>
<tr>
<td>SEE</td>
<td>Solar EUV Experiment</td>
</tr>
<tr>
<td>SEL</td>
<td>Single-event latch-up</td>
</tr>
<tr>
<td>SEM</td>
<td>Scanning electron microscope and Solar Extreme-ultraviolet Monitor</td>
</tr>
<tr>
<td>SERTS</td>
<td>Solar Extreme-ultraviolet Research Telescope and Spectrograph</td>
</tr>
<tr>
<td>SGR</td>
<td>Soft gamma repeater</td>
</tr>
<tr>
<td>SI</td>
<td>Système International d’Unités, International System of Units</td>
</tr>
<tr>
<td>SICDH</td>
<td>Science instruments command and data handling system</td>
</tr>
<tr>
<td>SIGMA</td>
<td>French telescope aboard <em>GRANAT</em></td>
</tr>
<tr>
<td>SIS</td>
<td>Superconductor-insulator-superconductor</td>
</tr>
<tr>
<td>SLAC</td>
<td>Stanford Linear Accelerator Center</td>
</tr>
<tr>
<td>SN</td>
<td>Supernova</td>
</tr>
<tr>
<td>SNR</td>
<td>Signal-to-noise ratio</td>
</tr>
<tr>
<td>SOC</td>
<td>Science operations coordinator</td>
</tr>
<tr>
<td>SOFIA</td>
<td>Stratospheric Observatory For Infrared Astronomy</td>
</tr>
<tr>
<td>SOLSTICE</td>
<td>Solar-Stellar Irradiance Comparison Experiment</td>
</tr>
<tr>
<td>SPAN</td>
<td>Spiral anode</td>
</tr>
<tr>
<td>SPENVIS</td>
<td>Space Environment Information System</td>
</tr>
<tr>
<td>SPI</td>
<td>Spectrometer on <em>INTEGRAL</em></td>
</tr>
<tr>
<td>SPIFI</td>
<td>South Pole Imaging Fabry–Perot Interferometer</td>
</tr>
<tr>
<td>SPIRE</td>
<td>Spectral and Photometric Imaging Receiver</td>
</tr>
<tr>
<td>SPOrt</td>
<td>Sky Polarization Observatory</td>
</tr>
<tr>
<td>SQUID</td>
<td>Superconducting quantum interference device</td>
</tr>
<tr>
<td>SRC</td>
<td>Science Research Council (UK)</td>
</tr>
<tr>
<td>SRON</td>
<td>Netherlands Institute for Space Research</td>
</tr>
<tr>
<td>SSI</td>
<td>Solar spectral irradiance</td>
</tr>
<tr>
<td>SSPP</td>
<td>Solar/Stellar Pointing Platform</td>
</tr>
<tr>
<td>SST</td>
<td>Sea surface temperature and Swedish Solar Telescope</td>
</tr>
<tr>
<td>STFC</td>
<td>Science and Technology Facilities Council, UK</td>
</tr>
<tr>
<td>STIS</td>
<td>Space Telescope Imaging Spectrograph</td>
</tr>
<tr>
<td>STJ</td>
<td>Superconducting tunnel junction</td>
</tr>
</tbody>
</table>
STR .......... Special theory of relativity
STScI .......... Space Telescope Science Institute
SUMER .......... Solar Ultraviolet Measurements of Emitted Radiation
SUMI .......... Solar Ultraviolet Magnetograph Investigation
SURF .......... Synchrotron Ultraviolet Radiation Facility
SUSIM .......... Solar Ultraviolet Spectral Irradiance Monitor
SVD .......... Singular value decomposition
SWB .......... Spider-Web Bolometer
SWFM .......... Solid wide field Michelson (interferometer)
SWIR .......... Short-wave IR
SWS .......... Short Wavelength Spectrometer
SXT .......... Soft X-ray Telescope
TAI .......... Temps atomique international, international atomic time
TDI .......... Time, delay and integrate (mode)
TDM .......... Time division multiplexer
TDMA .......... Time division multiple access
TEMS .......... Transition-Edge Microcalorimeter Spectrometer
TES .......... Transition-edge sensor and Tropospheric Emission Spectrometer
TGRS .......... Transient Gamma-Ray Spectrometer
THEMIS .......... Telescopio Heliografico para el Estudio del Magnetismo y de las Inestabilidades Solares
TID .......... Total ionising dose
TIM .......... Total Irradiance Monitor
TOF .......... Time of flight
TPF .......... Terrestrial Planet Finder / Darwin
TQCM .......... Temperature-controlled quartz crystal micro balance
TRC .......... Transition Region Camera
TSI .......... Total solar irradiance
TXI .......... Tunable X-ray Imager
UC/UVS .......... University of Colorado/Ultraviolet Spectrometer
UCS .......... Ultraviolet Coronal Spectrometer
ULIRG .......... Ultraluminous infrared galaxy
URA .......... Uniformly Redundant Array
UTC .......... Coordinated universal time
UV .......... Ultraviolet
UVCS .......... Ultraviolet Coronagraph Spectrometer
UVISI .......... Ultraviolet and Visible Imagers and Spectrographic Imagers on MSX
UVOT .......... Ultraviolet and Spectroscopic Telescope
UVSP .......... Ultraviolet Spectrometer and Polarimeter
VAULT .......... Very high Angular-resolution Ultraviolet Telescope
VDF .......... Velocity distribution function
VIRGO .......... Variability of Solar Irradiance and Gravity Oscillations
VLA .......... Very Large Array
VLBI .......... Very Long Baseline Interferometry
VLT .......... Very Large Telescope
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLWIR</td>
<td>Very long-wave IR</td>
</tr>
<tr>
<td>VPG</td>
<td>Volume phase grating</td>
</tr>
<tr>
<td>VUV</td>
<td>Vacuum ultraviolet</td>
</tr>
<tr>
<td>WBG(M)</td>
<td>Wide band gap (material)</td>
</tr>
<tr>
<td>WBS</td>
<td>Wide Band Spectrometer</td>
</tr>
<tr>
<td>WFC</td>
<td>Wide Field Camera</td>
</tr>
<tr>
<td>WFM</td>
<td>Wide field Michelson (interferometer)</td>
</tr>
<tr>
<td>WFPC</td>
<td>Wide Field and Planetary Camera</td>
</tr>
<tr>
<td>WFS</td>
<td>Wavefront sensor</td>
</tr>
<tr>
<td>WIM</td>
<td>Warm ionized medium</td>
</tr>
<tr>
<td>WRR</td>
<td>World radiometric reference</td>
</tr>
<tr>
<td>WSA</td>
<td>Wedge-and-strip array</td>
</tr>
<tr>
<td>XDL</td>
<td>Cross-delay line</td>
</tr>
<tr>
<td>XQC</td>
<td>X-ray Quantum Calorimeter</td>
</tr>
<tr>
<td>XS</td>
<td>Crossed strip</td>
</tr>
<tr>
<td>XUV</td>
<td>Extreme ultraviolet</td>
</tr>
<tr>
<td>YBCO</td>
<td>Yttrium barium copper oxide, YBa$_2$Cu$_3$O$_7$</td>
</tr>
<tr>
<td>ZIMPOL</td>
<td>Zurich Imaging Polarimeter</td>
</tr>
</tbody>
</table>
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