The IVOA Standard Vocabulary

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Introduction.

Astronomical vocabulary: present status

A&A thesaurus,
A&A keywords

A new Standard Vocabulary

starting lists:
A&A thesaurus,
A&A keywords,
Abstracts of papers in the 6 major journals, years 2000-2005,
ucd1+,
Simbad's object types

.. .. ..

General rules to form words for the **VO standard vocabulary**:

- an IVOA element of the Standard Vocabulary (an element) is described following the same general syntactical rules already used in the IVOA standard UCD1+ :

  root-concept [[[subordinate-concept(s)] ; concept-specification(s)]..]

  root-concept is always an atom, subordinate-concepts and concept-specifications can be words (combinations of atoms)
- generally accepted abbreviations are used when the alternative is simply quite long. The border is somewhere between "ISM" instead of "interstellar_medium" and "supernova" instead of "SN" and obviously a question of taste.
- general groupings are plural when appropriate (e.g. "stars", "galaxies")
- sub-groupings are singular (e.g. "stars.cluster") or adjectival (e.g. "galaxies.active") as appropriate
- capital letters are used when normally used (e.g. "region.HII", not "region.hii")
- embedded spaces are dropped and bridged with capital letters (e.g. "dwarfNova", not "dwarf nova" or "dwarf_nova")
- hyphens are kept as usual (e.g. "X-ray")
- object names assumed as archetypal of an object class (e.g. "RRLyrae" = "RR Lyrae stars") or discoverer's name describing an object class (e.g. "Seyfert" = "AGN of a type first

described/discovered by Prof. Seyfert") will be sub-words of "class" (e.g. "stars.variable;class.RRLyr" and "galaxies.AGN;class.Seyfert").

- in the case of Category 2 (object types) sometimes an object or a class of objects are commonly designated by an abbreviated form or acronym. In such cases the standard word can be replaced by its abreviated form or acronym, if this appears in the standard list of "alias" words (e.g. "alias.GRB" is equivalent to "process.variation.burst;em.gamma", and "alias.SNIa" stands for "stars.superNova;class.Ia").
- an **event** is a time-tagged phenomenon, process or formation of feature (like a spot, a ring, etc.).
- to indicate that an object (objectX) is a member of a multiple/composite object (objectY), the qualifier "stat.member" should be used. The general rule for building ucd1+ is used, i.e. the object we are interested in is in the first place. The syntax is the following:
  objectX;objectY;[objectZ;...]stat.member

1. Category: "**astrophysical phenomenon, process or feature**"

`(starting lists: A&A thesaurus, A&A keywords, UCD1+)`

Description	**Standard word**
Extinction or absorption	phys.absorption
Atomic/molecular excitation	phys.atmol.excitation
Ionization, jump from bound to unbound energy state	phys.atmol.ionization
Transition between states	phys.atmol.transition
Molecular dissociation	phys.mol.dissociation
Polarization	phys.polarization
Astrophysical phenomenon, process or feature	process
Generic absorption of wave or particle	process.absorption
Acceleration (of particles, ..)	process.acceleration
Mass accretion	process.accretion
Gravitational collapse	process.collapse
Conduction	process.conduction
Convection	process.convection
Diffusion	process.diffusion
Circum-object disk with thickness H << R and R_in << R_out	process.disk
Eclipse of two physically related objects	process.eclipse
Generic emission of wave or particle	process.emission
Sudden brightening, outburst	process.eruption
Explosion	process.explosion
Excitation, jump in a higher energy (bound) state	process.excitation /phys.atmol.exc..
Gravitational lensing	process.gravitation.lensing
Non-resolved gravitational lensing	process.gravitation.micro-lensing
Gravitational wave	process.gravitation.wave
Generic instability	process.instability
Generic interaction between two or more distinct objects	process.interaction
Maser	process.maser
Mass loss	process.mass-loss / phys.mass.loss
Ejection, loss of a distinct body of mass	process.mass-loss.ejection
Mass-loss through a collimated jet	process.mass-loss.jet

Mass-loss through a poorly collimated wind	process.mass-loss.wind
Merging of two or more distinct objects	process.merging
Nuclear reactions, nucleosynthesis	process.nucleosynthesis
Occultation of two physically unrelated objects	process.occultation
Pulsation	process.pulsation
Non-radial pulsation	process.pulsation.non-radial
Radial pulsation	process.pulsation.radial
Radiation mechanisms: non-thermal	process.radiation.non-thermal
Radiation mechanisms: thermal	process.radiation.thermal
Circum-object ring with thickness H << R and R_in ~ R_out	process.ring
Recombination, from unbound to bound energy state	process.recombination
Redshift (as a process)	process.redshift
Rotation	process.rotation
Scattering	process.scattering
Shock front/wave (HD, MHD, Ionization, etc.)	process.shock
Distinct physical region on an object with different properties	process.spot
Starburst	process.starburst
Change in some property with time	process.variation
Generic sudden change with time	process.variation.burst
Cyclic, periodic change	process.variation.cyclic
Rapid change with time followed by a return to normalcy	process.variation.flare
Sudden change of frequency	process.variation.glitch
Very luminous state of variable object, high-state	process.variation.high-state
Quiescent or low luminous state of variable object	process.variation.low-state
Semi-regular or quasi-periodic variation	process.variation.quasi-periodic
Temporary, non periodic change	process.variation.transient

2. Category: "**object types**"
(spectral types and luminosity/morphological classes not yet included)
(starting lists: A&A thesaurus, A&A keywords, Simbad's object types)

Description	**Standard word**	**Alias**
Herbig-Haro Object	ISM.Herbig-Haro	HH
SuperNova Remnant	ISM.SNRemnant	SNR
SuperNova Remnant candidate	ISM.SNRemnant;stat.possible	
Generic Cloud	ISM.cloud	
Part of Cloud	ISM.cloud;stat.partOf	
Cloud of unknown nature	ISM.cloud;stat.unknown	
High-velocity Cloud	ISM.cloud.high-velocity	HVC
Molecular Cloud	ISM.cloud.molecular	
Cometary Globule	ISM.cometaryGlobule	
Nebula of unknown nature	ISM.nebula;stat.unknown	
Bright Nebula	ISM.nebula.bright	
Dark Nebula	ISM.nebula.dark	
Galactic Nebula	ISM.nebula.galactic	
Reflection Nebula	ISM.nebula.reflection	
Planetary Nebula	ISM.planetaryNebula	PN
Possible Planetary Nebula	ISM.planetaryNebula;stat.possible	
HI shell	ISM.shell.HI	
HI (neutral) region	ISM.region.HI	HI

HII (ionized) region	ISM.region.HII	HII
Generic galaxy	galaxies	
HII galaxy	galaxies.HII	
Elliptical or lenticular galaxy	galaxies.elliptical	
Irregular galaxy	galaxies.irregular	
Spiral galaxy	galaxies.spiral	
Radio galaxy	galaxies;em.radio	
Gravitationnaly Lensed Image of a galaxy	galaxies;process.gravitation.lensing	
Interacting galaxies	galaxies;process.interaction	
Galaxy with high redshift	galaxies;process.redshift;stat.high	
Starburst galaxy	galaxies;process.starburst	
Part of a galaxy	galaxies;stat.partOf	
Active Galactic Nucleus	galaxies.AGN	AGN
BL Lac – type object	galaxies.AGN;class.BLLac	BLLac
Seyfert galaxy	galaxies.AGN;class.Seyfert	Seyfert
Seyfert 1 galaxy	galaxies.AGN;class.Seyfert1	Seyfert1
Seyfert 2 galaxy	galaxies.AGN;class.Seyfert2	Seyfert2
Active Galactic Nucleus Candidate	galaxies.AGN;stat.possible	
Blazar	galaxies.AGN.Blazar	Blazar
LINER-type Active Galactic Nucleus	galaxies.AGN.LINER	LINER
Quasar	galaxies.QSO	QSO
Gravitationnaly Lensed Image of a Quasar	galaxies.QSO;process.gravitation.lensing	
Quasar Candidate	galaxies.QSO;stat.possible	
Absorption Line system	galaxies.absLineSystem	ALS
Ly alpha Absorption Line system	galaxies.absLineSystem.Ly-alpha	
Damped Ly-alpha Absorption Line system	galaxies.absLineSystem.Ly-alpha.damped	
Metallic Absorption Line system	galaxies.absLineSystem.metal-lines	
Lyman limit system	galaxies.absLineSystem.Ly-limit	LLS
Broad Absorption Line system	galaxies.absLineSystem.Broad	
Active galaxy	galaxies.active	
Compact Group of Galaxies	galaxies.compactGroup	
Cluster of Galaxies	galaxies.cluster	
Galaxy in Cluster of Galaxies	galaxies;galaxies.cluster;stat.member	
Dwarf galaxy	galaxies.dwarf	
Giant galaxy	galaxies.giant	
Group of Galaxies	galaxies.group	
Galaxy in Group of Galaxies	galaxies;galaxies.group;stat.member	
Pair of Galaxies	galaxies.pair	
Galaxy in Pair of Galaxies	galaxies;galaxies.pair;stat.member	
Supercluster of Galaxies	galaxies.superCluster	
Generic object in the sky	obj	
Gravitationnaly Lensed Image	obj;process.gravitation.lensing	
Region defined in the sky	obj.region	
Multiple, composite object	obj;stat.multiple	
Object of unknown nature	obj;stat.unknown	

Black Hole	obj.blackHole	BH
Black Hole Candidate	obj.blackHole;stat.possible	
Void, underdense region of the Universe	obj.void	
Micro-Lensing Event	process.gravitation.micro-lensing	
Gamma-ray burst	process.variation.burst;em.gamma	GRB
Generic source of radiation (em, gravitational) or of particles	source	
Far-IR source (wl >= 30 µm)	source;em.FIR	
Infra-Red source	source;em.IR	IRS
Near-IR source (wl < 10 µm)	source;em.NIR	
UV-emission source	source;em.UV	
X-ray source	source;em.X-ray	
Gamma-ray source	source;em.gamma	
Radio-source millimetric	source;em.mm	
Radio-source	source;em.radio	
Emission Object	source;process.emission	
Gravitational Source	source;process.gravitation	
Blue object	source.blue	
Extremely Red Object (ERO)	source.extremeRed	ERO
Maser source	source.maser	
Star, Stars	stars	
Be Star	stars.spType.Be	Be
Star with envelope of CH type	stars.envelope.CH	
Star with envelope of OH/IR type	stars.envelope.OH/IR	OH/IR
S Star	stars.spType.S	
T Tau-type Star	stars;class.Ttau	TTau
Wolf-Rayet Star	stars;class.Wolf-Rayet	WR
Carbon Star	stars.spType.carbon	
Early-type (early spectral type, hot) Star	stars.spType.early	
Late-type (late spectral type, cold) Star	stars.spType.late	
Star of spectral type xx	stars.spType.xx	
Emission-line Star	stars;em.line	
High-velocity Star	stars;phys.velocity;stat.high	
High proper-motion Star	stars;pos.pm;stat.high	
Multiple star system	stars;stat.multiple	
Peculiar Star	stars;stat.peculiar	
Asymptotic Giant Branch Star	stars.AGB	AGB
Horizontal Branch Star	stars.HB	HB
Young Stellar Object	stars.YSO	YSO
Double (binary) Star	stars.binary	
X-ray binary	stars.binary;em.X-ray	
Eclipsing binary	stars.binary;process.eclipse	
Star in double or multiple system	stars;stars.binary;stat.member	
Eclipsing binary of Algol type	stars.binary;process.eclipse;class.Algol	Algol
Eclipsing binary of beta Lyr type	stars.binary;process.eclipse;class.betaLyr	betaLyr
Eclipsing binary of W UMa	stars.binary;process.eclipse;class.WUMa	WUMa

type		
Eclipsing binary (2nd!!)	stars.binary.eclipsing	
Spectroscopic binary	stars.binary.specroscopic	
Low Mass X-ray binary	stars.binary.low-mass;em.X-ray	LMXB
High Mass X-ray binary	stars.binary.high-mass;em.X-ray	HMXB
Brown Dwarf (low-mass)	stars.brownDwarf	
Circumstellar matter	stars.circumstellar	CSM
Cluster of Stars	stars.cluster	
Star in cluster of Stars	stars;stars.cluster;stat.member	
Star Cluster in galaxy	stars.cluster;galaxies;stat.member	
Association of Stars	stars.cluster.association	
Star in association of Stars	stars;stars.cluster.association;stat.member	
Globular Cluster	stars.cluster.globular	
Possible Globular Cluster	stars.cluster.globular;stat.possible	
Open (galactic) Cluster	stars.cluster.open	OCl
Star in Nebula	stars;ISM.nebula;stat.member	
Neutron Star	stars.neutron	
Central Star of Planetary Nebula	stars.planetaryNebula	CSPN
Star showing eclipses by its planet	stars.planetarySystem;process.eclipse	
Sub-stellar object	stars.planetarySystem.obj	
Extra-solar Planet	stars.planetarySystem.planet	
Extra-solar Planet Candidate	stars.planetarySystem.planet;stat.possible	
Post-AGB Star	stars.post-AGB	
Pre-main sequence Star	stars.preMS	PMS
Pulsar	stars.pulsar	
SuperNova (the object)	stars.superNova	SN
SuperNova of type xx (I, II, Ia, etc.)	stars.superNova.xx	SNxx
SuperNova (the explosion of a star)	stars.superNova;process.explosion	
Symbiotic Star	stars.symbiotic	
Variable Star	stars.variable	
Variable Star of BY Dra type	stars.variable;class.BYDra	BYDra
Variable Star of FU Ori type	stars.variable;class.FUOri	FUOri
Variable Star of Mira Cet type	stars.variable;class.MiraCet	Mira
Variable Star of Orion Type	stars.variable;class.Orion	
Variable Star of R CrB type	stars.variable;class.RCrB	RCrB
Variable Star of RR Lyr type	stars.variable;class.RRLyr	RRLyr
Variable Star of RS CVn type	stars.variable;class.RSCVn	RSCVn
Variable Star of RV Tau type	stars.variable;class.RVTau	RVTau
Variable Star of W Vir type	stars.variable;class.Wvir	WVir
Variable Star of alpha2 CVn type	stars.variable;class.alf2CVn	
Variable Star of beta Cep type	stars.variable;class.betaCep	betaCep
Variable Star of delta Sct type	stars.variable;class.deltaSct	
Variable Star of gamma Dor type	stars.variable;class.gammaDor	gammaDor
Eruptive variable Star	stars.variable;process.eruption	
Pulsating variable Star	stars.variable;process.pulsation	
Rotationally variable Star	stars.variable;process.rotation	

Ellipsoidal variable Star	stars.variable;process.rotation.ellipsoidal	
Flare Star	stars.variable;process.variation.flare	
Semi-regular pulsating Star	stars.variable;process.variation.quasi-periodic	
Star suspected of Variability	stars.variable;stat.possible	
Cataclysmic Variable Star	stars.variable.cataclysmic	CV
Cataclysmic Var. DQ Her type	stars.variable.cataclysmic;class.DQHer	DQHer
Cataclysmic Var. AM Her type	stars.variable.cataclysmic;class.AMHer	AMHer
Cepheid variable Star	stars.variable.cepheid	
Classical Cepheid (delta Cep type)	stars.variable.cepheid;class.deltaCep	deltaCep
Dwarf Nova	stars.variable.dwarfNova	
Variable Star of irregular type	stars.variable.irregular	
Nova	stars.variable.nova	nova
Nova-like Star	stars.variable.nova-like	
White Dwarf	stars.whiteDwarf	WD
Pulsating White Dwarf	stars.whiteDwarf;proces.pulsation	

3. Category: "**Astronomical instruments and methods**"

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(starting lists: ucd1+, A&A keywords, 6 major journals years 2000-2005.
 Temporarily limited to imagers and spectrographs)
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Description	**Standard word**
Generic instrument	instr
Generic imaging instrument (camera, imager)	instr.imager
Adaptive optics imager	instr.imager.adaptive-optics
Coronal imager	instr.imager.coronal
Echelle imager	instr.imager.echelle
Wide-field imager	instr.imager.wide-field
Superconductor Tunnel Junction imager	instr.imager.STJ
InfraRed imager	instr.imager.*;em.IR
Medium InfraRed imager	instr.imager.*;em.MIR
Near InfraRed imager	instr.imager.*;em.NIR
Optical imager	instr.imager.*;em.opt
Far UltraViolet imager	instr.imager.*;em.FUV
X-ray imager	instr.imager.*;em.X-ray
Hard X-ray imager	instr.imager.*;em.X-ray.hard
Gamma ray imager	instr.imager.*;em.gamma
High resolution imager	instr.imager.*;pos.angResolution.high
Low resolution imager	instr.imager.*;pos.angResolution.low
Generic spectrograph	instr.spectrograph
Coude spectrograph	instr.spectrograph.coude
Echelle spectrograph	instr.spectrograph.echelle
Fiber-fed echelle spectrograph	instr.spectrograph.echelle.fiber-fed
Fabry-Perot spectrograph/interferometer	instr.spectrograph.Fabry-Perot
Grating spectrograph	instr.spectrograph.grating
Multi-order grating spectrograph	instr.spectrograph.grating.multiorder
Grism	instr.spectrograph.grism
Imaging spectrograph	instr.spectrograph.imaging
Integral-field (3D, image-slicing) spectr.	instr.spectrograph.integral-field
Multi-fiber spectr. (=multi-object ?)	instr.spectrograph.multi-fiber

Multi-object spectrograph	instr.spectrograph.multi-object
Multi-slit spectr. (=multi-object ?)	instr.spectrograph.multi-slit
Spectrograph with atmospheric OH band suppressor	instr.spectrograph.OHsuppression
spectro-polarimeter	instr.spectrograph.polarimeter
Medium-InfraRed spectrograph	instr.spectrograph.*;em.MIR
Near-InfraRed spectrograph	instr.spectrograph.*;em.NIR
Optical spectrograph	instr.spectrograph.*;em.opt
UltraViolet spectrograph	instr.spectrograph.*;em.UV
Low-dispersion spectrograph	instr.spectrograph.*;instr.dispersion.low
High-dispersion spectrograph	instr.spectrograph.*;instr.dispersion.high
Low-resolution spectrograph	instr.spectrograph.*;spect.resolution.low
Medium-resolution spectrograph	instr.spectrograph.*;spect.resolution.medium
High-resolution spectrograph	instr.spectrograph.*;spect.resolution.high

Appendix A.

List of elements (ucd-words) used to describe Category 1 and 2 concepts:

class.alf2CVn
class.AMHer
class.betaCep
class.BLLac
class.BYDra
class.CH
class.deltaCep
class.deltaSct
class.DQHer
class.FUOri
class.gammaDor
class.HII
class.MiraCet
class.OH-IR
class.Orion
class.RCrB
class.RRLyr
class.RSCVn
class.RVTau
class.Seyfert
class.Seyfert1
class.Seyfert2
class.TTau
class.Wolf-Rayet
class.WVir
em.FIR
em.gamma
em.IR
em.line
em.mm
em.NIR
em.radio
em.UV
em.X-ray
galaxies
galaxies.absLineSystem
galaxies.absLineSystem.Broad
galaxies.absLineSystem.Ly-alpha
galaxies.absLineSystem.Ly-alpha.damped
galaxies.absLineSystem.Ly-limit
galaxies.absLineSystem.metal-lines
galaxies.active
galaxies.AGN
galaxies.AGN.Blazar
galaxies.AGN.LINER
galaxies.cluster
galaxies.compactGroup
galaxies.dwarf
galaxies.elliptical
galaxies.giant
galaxies.group
galaxies.HII
galaxies.irregular
galaxies.pair
galaxies.QSO
galaxies.spiral
galaxies.superCluster
ISM.cloud
ISM.cloud.high-velocity
ISM.cloud.molecular
ISM.cometaryGlobule
ISM.Herbig-Haro
ISM.nebula
ISM.nebula.bright
ISM.nebula.dark
ISM.nebula.galactic
ISM.nebula.reflection
ISM.planetaryNebula
ISM.region.HI
ISM.region.HII
ISM.shell.HI
ISM.SNRemnant
obj
obj.blackHole
obj.region
obj.void
phys.absorption
phys.acceleration
phys.atmol.excitation
phys.atmol.ionization
phys.atmol.transition
phys.mol.dissociation
phys.polarization
phys.velocity
pos.pm
proces.pulsation
process
process.absorption
process.acceleration
process.accretion
process.collapse
process.conduction
process.convection
process.diffusion
process.disk
process.eclipse
process.eclipse
process.emission
process.eruption
process.excitation
process.explosion
process.gravitation
process.gravitation.lensing
process.gravitation.micro-lensing
process.gravitation.wave
process.instability
process.interaction
process.maser
process.mass-loss
process.mass-loss.ejection
process.mass-loss.jet
process.mass-loss.wind
process.merging
process.nucleosynthesis
process.occultation
process.pulsation
process.pulsation.non-radial
process.pulsation.radial
process.radiation.non-thermal

process.radiation.thermal
process.recombination
process.redshift
process.redshift
process.ring
process.rotation
process.rotation.ellipsoidal
process.scattering
process.shock
process.spot
process.starburst
process.variation
process.variation.burst
process.variation.cyclic
process.variation.flare
process.variation.glitch
process.variation.high-state
process.variation.low-state
process.variation.quasi-periodic
process.variation.transient
source
source.blue
source.extremeRed
source.maser
stars
stars.AGB
stars.binary
stars.binary.eclipsing
stars.binary.high-mass
stars.binary.low-mass
stars.binary.specroscopic
stars.brownDwarf
stars.circumstellar
stars.cluster
stars.cluster.association
stars.cluster.globular
stars.cluster.open
stars.envelope.CH
stars.envelope.OH/IR
stars.HB
stars.neutron
stars.planetaryNebula
stars.planetarySystem
stars.planetarySystem.planet
stars.post-AGB
stars.preMS
stars.pulsar
stars.spType.Be
stars.spType.carbon
stars.spType.early
stars.spType.late
stars.spType.S
stars.spType.xx
stars.superNova
stars.superNova.xx
stars.symbiotic
stars.variable
stars.variable.cataclysmic
stars.variable.cepheid
stars.variable.dwarfNova
stars.variable.irregular
stars.variable.nova
stars.variable.nova-like
stars.whiteDwarf
stars.YSO
stat.member
stat.multiple
stat.partOf
stat.peculiar
stat.possible
stat.unknown

Appendix B.

List of acronyms that can be used as aliases for Category 2 concepts (object types).

The format is: alias.acronym

Acronyms:

AGB
AGN
Algol
ALS
AMHer
Be
betaCep
betaLyr
BH
Blazar
BLLac
BYDra
CSM
CSPN
CV
deltaCep
DQHer
ERO
FUOri
gammaDor
GRB
HB
HH
HI
HII
HMXB
HVC
IRS
LINER
LLS
LMXB
Mira
nova
OCl
OH/IR
PMS
PN
QSO
RCrB
RRLyr
RSCVn
RVTau
Seyfert
Seyfert1
Seyfert2
SN
SNR
SNxx
TTau
WD
WR
WUMa
WVir
YSO