RESOLUTION B1

on guidelines for the designations and specifications of optical and infrared astronomical photometric passbands.

Proposed by IAU Commission 25

The XXVIII General Assembly of the International Astronomical Union,

noting

that considerable confusion has existed and continues to exist in the defining and naming of photometric passbands of all spectral widths in the visible and infrared regions of the electromagnetic spectrum,

considering

that minimizing such confusion has been a long-time goal of members of Commission 25 [e.g., see remarks by Wesselink and by Greaves in Transactions of the IAU, VII, pp. 267-273 (1950)],

recommends

1. that proposers of new passband systems should check the IAU Commission 25 website and links therein, especially to http://ulisse.pd.astro.it/Astro/ADPS/ (extended version of the paper by Moro and Munari 2000, A&AS 147, 361) to ascertain what passband names have already been used, before creating designations for new passbands.*

2. that names for new passbands should avoid relatively well known designations, such as UBVRIJHKLMNQ, and the designations ZJHKLMNQ should be used henceforth to refer exclusively to the terrestrial atmospheric windows in the near and intermediate infrared (see Young et al. A&AS, 105, 259-279; Milone & Young (2005), PASP, 117, 485-502). #

3. that any publication presenting the new passbands should contain the following information, to aid in transformations and standardizations:

a) a measure of central wavelength which is not flux-dependent, such as the pivot wavelength, or mean photon wavelength, as defined, for example, in Bessell & Murphy (2012), PASP, 124, 140-157;
b) an indication of bandwidth, such as FWHM;
c) the spectral profile of the passband, unless it is completely symmetrical, as, for example, triangular passbands, when this shape and the domain in which this is the case (wavelength or wave number/frequency) are stipulated;
d) a clear statement on whether the passband profile includes the spectral sensitivity curve of the detector or not, and, if so, the characteristics of the detector;
e) the temperature at which these specifications apply;

f) such other details (for example, roll-off, pinhole and leakage specifications) as may be needed to obtain a closely matching filter from manufacturers.

3. that a copy of this resolution should be sent to all editors of astronomical and other journals which publish papers relating to astronomical photometry.

* Well known and accepted nomenclature also appears in the Drilling and Landolt chapter in Cox's "Allen's Astrophysical Quantities", 4th edition, 2000, page 386, Table 15.5, and other information on basic systems appears in V. Straizys' "Multicolor Stellar Photometry" volume, 1995 (second printing), (see http://www.itpa.lt/MulticolorStellarPhotometry), among other sources.

For example, "Y" and "iz" are designations that have been applied to passbands in the 1 micro-m (Z) atmospheric window.

RESOLUTION B2

on the re-definition of the astronomical unit of length.

Proposed by the IAU Division I Working Group Numerical Standards
and supported by Division I

The XXVIII General Assembly of International Astronomical Union,

noting

1. that the International Astronomical Union (IAU) 1976 System of Astronomical Constants specifies the units for the dynamics of the solar system, including the day (D=86400 s), the mass of the Sun, M_S, and the *astronomical unit of length* or simply *the astronomical unit* whose definition[i] is based on the value of the Gaussian gravitational constant,
2. that the intention of the above definition of the astronomical unit was to provide accurate distance ratios in the solar system when distances could not be estimated with high accuracy,
3. that, to calculate the solar mass parameter, GM_S, previously known as the heliocentric gravitation constant, in Système International (SI) units[ii],the Gaussian gravitational constant k, is used, along with an astronomical unit determined observationally,
4. that the IAU 2009 System of astronomical constants (IAU 2009 Resolution B2) retains the IAU 1976 definition of the astronomical unit, by specifying k as an "auxiliary defining constant" with the numerical value given in the IAU 1976 System of Astronomical Constants,
5. that the value of the astronomical unit compatible with Barycentric Dynamical Time (TDB) in Table 1 of the IAU 2009 System (149 597 870 700 m ± 3 m), is an average (Pitjeva and Standish 2009) of recent estimates for the astronomical unit defined by k,
6. that the TDB-compatible value for GM_S listed in Table 1 of the IAU 2009 System, derived by using the astronomical unit fit to the DE421 ephemerides (Folkner *et al*. 2008), is consistent with the value of the astronomical unit of Table 1 to within the errors of the estimate; and

considering

1. the need for a self-consistent set of units and numerical standards for use in modern dynamical astronomy in the framework of General Relativity, [iii]
2. that the accuracy of modern range measurements makes the use of distance ratios unnecessary,
3. that modern planetary ephemerides can provide GM_S directly in SI units and that this quantity may vary with time,
4. the need for a unit of length approximating the Sun-Earth distance, and
5. that various symbols are presently in use for the astronomical unit,

recommends

1. that the astronomical unit be re-defined to be a conventional unit of length equal to 149 597 870 700 m exactly, in agreement with the value adopted in IAU 2009 Resolution B2,
2. that this definition of the astronomical unit be used with all time scales such as TCB, TDB, TCG, TT, *etc*.,
3. that the Gaussian gravitational constant k be deleted from the system of astronomical constants,
4. that the value of the solar mass parameter, GM_S, be determined observationally in SI units, and
5. that the unique symbol "au" be used for the astronomical unit.

References

Capitaine, N., Guinot, B., Klioner, S., 2011, Proposal for the re-definition of the astronomical unit of length through a fixed relation to the SI metre, Proceedings of the Journées 2010 Systèmes de référence spatio-temporels, N. Capitaine (ed.), Observatoire de Paris, pp 20-23

Fienga, A., Laskar, J., Morley, T., Manche, H. et al., 2009, INPOP08: a 4D-planetary ephemeris, A&A 507, 3, 1675

Fienga, A., Laskar, J., Kuchynka, P., Manche, H., Desvignes, G., Gastineau, M., Cognard, I., Theureau, G., 2011, INPOP10a and its applications in fundamental physics, Celest. Mech. Dyn. Astr., Volume 111, on line edition (http://www.springerlink.com/content/0923-2958).

Folkner, W.M., Williams, J.G., Boggs, D.H., 2008, Memorandum IOM 343R-08-003, Jet Propulsion Laboratory

International Astronomical Union (IAU), Proceedings of the Sixteenth General Assembly," Transactions of the IAU, XVIB, p. 31, pp. 52-66, (1976)

International Astronomical Union (IAU), Proceedings of the Twenty Seventh General Assembly," Transactions of the IAU, VXVIIB, p. 57, pp. 6: 55-70 (2010)

Klioner, S., 2008, Relativistic scaling of astronomical quantities and the system of astronomical units, A&A 478, 951

Klioner, S., Capitaine, N., Folkner, W., Guinot, B., Huang, T.-Y., Kopeikin, S. M., Pitjeva, E., Seidelmann P.K., Soffel, M., 2009, Units of relativistic time scales and associated quantities, in Proceedings of the International Astronomical Union, IAU Symposium, Volume 261, p. 79-84

Luzum, B., Capitaine, N., Fienga, A., Folkner, W., Fukushima, T., Hilton. J., Hohenkerk, C., Krasinsky, G., Petit, G., Pitjeva, E., Soffel, M., Wallace, P., 2011, The IAU 2009 system of astronomical constants: the report of the IAU working group on numerical standards for Fundamental Astronomy, Celest. Mech. Dyn. Astr., doi: 10.1007/s10569-011-9352-4

Pitjeva, E.V. and Standish, E.M., 2009, Proposals for the masses of the three largest asteroids, the Moon-Earth mass ratio and the astronomical unit, Celest. Mech. Dyn. Astr., 103, 365, doi: 10.1007/s10569-009-9203-8

Standish, E.M., 2004, The Astronomical Unit now, in Transits of Venus, New views of the Solar System and Galaxy, Proceedings of the IAU Colloquium 196, D. W. Kurtz ed., 163

---

[i] The IAU 1976 definition is: "The astronomical unit of length is that length (A) for which the Gaussian gravitational constant (k) takes the value of 0.017 202 098 95 when the units of measurements are the astronomical unit of length, mass and time. The dimensions of k^2 are those of the constant of gravitation (G), i.e., $L^3M^{-1}T^{-2}$. The term "unit distance" is also for the length A." Although this was the first descriptive definition of the astronomical unit, the practice of using the value of k as a fixed constant which served to define the astronomical unit was in use unofficially since the 19the century and officially since 1938.

[ii] Using the equation $A^3k^2/D^2=GM_S$ where A is the astronomical unit and D the time interval of one day, and k the Gaussian gravitational constant.

[iii] Relativistically a solar system ephemeris, for which the astronomical unit is a useful unit, is a coordinate picture of solar system dynamics. SI units are induced into such a coordinate picture by using the relativistic equations for photons and massive bodies and by relating the coordinates of certain events with observables expressed in SI units.

RESOLUTION B3

on the establishment of an International NEO early warning system.

Proposed by IAU Division III Working Group Near Earth Objects

The XXVIII General Assembly of the International Astronomical Union,

recognizing

-- that there is now ample evidence that the probability of catastrophic impacts of Near-Earth Objects (NEOs) onto the Earth, potentially highly destructive to life, and for humankind in particular, is not negligible and that appropriate actions are being developed to avoid such catastrophes;

-- that for the largest NEOs, thanks to the efforts of the astronomical community and of several space agencies, the cataloguing of the potentially hazardous ones, the monitoring of their impact possibilities, and the analysis of technologically feasible mitigations is reaching a satisfactory level;

-- that even the impact of small- to moderate-sized objects may represent a great threat to our civilizations and to the international community;

-- that our knowledge of the number, size, and orbital behaviour of smaller objects is still very limited, thus not allowing any reasonable anticipation on the likelihood of future impacts;

noting

that NEOs are a threat to all nations on Earth, and therefore that all nations should contribute to avert this threat;

recommends

that the IAU National Members work with the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) and the International Council for Science (ICSU) to coordinate and collaborate on the establishment of an International NEO early warning system, relying on the scientific and technical advice of the relevant astronomical community, whose main purpose is the reliable identification of potential NEO collisions with the Earth, and the communication of the relevant parameters to suitable decision makers of the nation(s) involved.

RESOLUTION B4

on the restructuring of the IAU Divisions

Proposed by the IAU Executive Committee

The XXVIII General Assembly of the International Astronomical Union,

noting

(a) that both the IAU and astronomy as a whole have evolved considerably since the current Divisions were introduced in 1994 and formally adopted in 1997, and that it is therefore appropriate to consider re-optimising the Divisional Structure,

(b) the report and recommendations of the Task Group established by the Executive Committee to examine the case for restructuring the Divisions, and the Executive Committee response to these recommendations,

(c) that the Commissions, Working Groups and other bodies under the Divisions may also require reform,

(d) that the implementation of the Strategic Plan through the Office of Astronomy for Development (OAD) and other associated programmes requires the Executive Committee to establish appropriate oversight and governance provisions for all Astronomy for Development activities, including the Office of Astronomy for Development, ensuring a strong link between these activities, the Divisions, and the Executive Committee.

approves

the proposal of the Executive Committee to restructure the Divisions as follows:

Division A Space and Time Reference Systems
Division B Facilities, Technologies, & Data Science
Division C Education, Outreach, & Heritage
Division D High Energies & Fundamental Physics
Division E Sun & Heliosphere
Division F Planetary Systems & Bioastronomy
Division G Stars & Stellar Physics
Division H Interstellar Matter & Local Universe
Division J Galaxies & Cosmology

and requests

the new Divisions, guided by the Executive Committee, to work together to produce initial plans for a revised structure for Commissions, Working Groups and other bodies to be approved, in accordance with the Statutes and Bye-Laws of the Union, by the Executive Committee at its meeting in May 2013.