RESOLUTION B1

The IAU Strategic Plan 2010-2020: Astronomy for Development

(Proposed by the Executive Committee)

The XXIX General Assembly of the International Astronomical Union,

Recognising

1. That the XXVII General Assembly, meeting in Rio de Janiero, Brazil, on 13 August 2009 unanimously passed a Resolution resolving that the IAU should "approve the goals specified in the Strategic Plan: Astronomy for the Development as objectives for the IAU in the coming decade,
2. That to further these objectives the IAU established the Office of Astronomy for Development (OAD) in Cape Town, South Africa, as an equal partnership between the IAU and the National Research Foundation of South Africa,
3. That the OAD has successfully promoted an ambitious international programme of activities in pursuit of the objectives of the IAU Strategic Plan,
4. That a recent independent review of the OAD concluded that "its performance has been outstanding, particularly given the very limited resources that have been made available to an organisation with such ambitious terms of reference,"

Resolves

1. That the pursuit of the goals of the Strategic Plan: Astronomy for the Developing World should continue until the XXXI General Assembly to be held August 2021,
2. That the Executive Committee should present for approval at the XXX General Assembly to be held in Vienna, Austria in August 2018 an extended Strategic Plan which addresses the future of the OAD and its activities beyond 2021,
3. That the Executive Committee should consult existing and potential stakeholders in the preparation of this Strategic Plan.

RESOLUTION B2
on recommended zero points for the absolute and apparent bolometric magnitude scales

Proposed by IAU Inter-Division A-G Working Group on Nominal Units for Stellar & Planetary Astronomy

The XXIXth International Astronomical Union General Assembly,

Noting

1. the absence of an exact definition of the zero point for the *absolute and apparent bolometric magnitude* scales, which has resulted in the proliferation of different zero points for bolometric magnitudes and bolometric corrections in the literature (ranging at approximately the tenth of a magnitude level; see e.g., Bessell, Castelli, & Plez 1998; Torres 2010),

2. that IAU Commissions 25 and 36 approved identical draft resolutions for defining the zero point for the bolometric magnitude scale (Andersen 1999), but that the resolution never subsequently reached the stage of approval by the IAU General Assembly, and was only sporadically adopted within the astronomical community,

3. that recent total solar irradiance measurements have led to a revised solar luminosity that differs slightly from the value used to set the zero point of the absolute bolometric magnitude scale in the Commission 25 and 36 draft resolutions,

Considering

1. the need for a standardized absolute and apparent bolometric magnitude scale for accurately and repeatably transforming photometric measurements into radiative luminosities and irradiances, independently of the variable Sun,

2. that multiple zero points for bolometric corrections pervade the literature due to the lack of a commonly adopted standard zero point for the bolometric magnitude scale,

Recommends

1. to define the zero point of the *absolute bolometric magnitude* scale by specifying that a radiation source with absolute bolometric magnitude[1] $M_{\rm Bol}$ = 0 mag has a radiative luminosity of exactly

$$L_\circ \;=\; 3.0128 \times 10^{28}\,\mathrm{W}\,. \tag{1}$$

   and the absolute bolometric magnitude $M_{\rm Bol}$ for a source of luminosity L (in W) is

$$M_{\rm Bol} \;=\; -2.5\,\log\,(L/L_\circ) \;=\; -2.5\,\log\,L \;+\; 71.197\,425\,... \tag{2}$$

   The zero point was selected so that the *nominal solar luminosity*[2] ($\mathcal{L}^{\rm N}_\odot$ = 3.828×10^{26} W) corresponds closely to absolute bolometric magnitude $M_{\rm Bol\odot}$ = 4.74 mag, the value most commonly adopted in the recent literature (e.g., Bessell, Castelli, & Plez 1998; Cox 2000; Torres 2010).

2. to define the zero point of the *apparent bolometric magnitude* scale by specifying that $m_{\rm Bol}$ = 0 mag corresponds to an *irradiance* or *heat flux density*[3] of

$$f_\circ \;=\; 2.518\,021\,002\,... \times 10^{-8}\,\mathrm{W\,m^{-2}} \tag{3}$$

and hence the apparent bolometric magnitude $m_{\rm Bol}$ for an irradiance f (in $\rm W\,m^{-2}$) is

$$m_{\rm Bol} = -2.5 \log (f/f_\circ) = -2.5 \log f - 18.997\,351 \ldots \quad (4)$$

The irradiance $f_\circ$ corresponds to that measured from an isotropically emitting radiation source with absolute bolometric magnitude $M_{\rm Bol} = 0$ mag (luminosity $L_\circ$) at the standard distance[4] of 10 parsecs (based on the IAU 2012 definition of the astronomical unit).

The adopted value of $f_\circ$ agrees with some in common use (e.g., Lang 1974, Cox 2000) at the level of < 0.1%. Using this zero point, the *nominal total solar irradiance* $S^{\rm N}_{\odot}$ ($1361\,\rm W\,m^{-2}$) corresponds to a solar apparent bolometric magnitude of $m_{\rm Bol\odot} \simeq -26.832$ mag.

References

Andersen, J. 1999, Transactions of the International Astronomical Union, Series B, 23, pgs. 141 & 182

Bessell, M. S., Castelli, F., & Plez, B. 1998, Astronomy & Astrophysics, 333, 231

Binney, J., & Tremaine, S. 2008, Galactic Dynamics: Second Edition, ISBN 978-0-691-13026-2 (HB). Published by Princeton University Press, Princeton, NJ USA

Bureau International des Poids et Mesures, 2006, The International System of Units (SI), 8th edition, Organisation Intergouvernementale de la Convention du Métre

Cox, A. N. 2000, Allen's Astrophysical Quantities, 4th Edition

Kopp, G. 2014, Journal of Space Weather and Space Climate, 4, A14

Kopp, G., Lawrence, G., Rottman, G., 2005, Solar Physics, 230, 129

Kopp, G., & Lean, J. L. 2011, Geophysical Research Letters, 38, L01706

Lang, K. R. 1974, Astrophysical Formulae, A Compendium for the Physicist and Astrophysicist, Springer-Verlag

Meftah, M., Irbah, A., Hauchecorne, A., et al. 2015, Solar Physics, 290, 673

Schmutz W., Fehlmann A., Finsterle W., et al. 2013, AIP Conf. Proc. 1531, p. 624627, doi:10.1063/1.4804847

Torres, G. 2010, Astronomical Journal, 140, 1158

Wilkins, G. A. 1989, "The IAU Style Manual (1989): The Preparation of Astronomical Papers and Reports"

Willson, R. C. 2014, Astrophysics & Space Science, 352, 341

Notes

[1] The notation of $M_{\rm bol}$ referring to *absolute bolometric magnitude* and $m_{\rm bol}$ referring to *apparent bolometric magnitude* was adopted by Commission 3 (Notations) at the VIth IAU General Assembly in Stockholm in 1938: https://www.iau.org/static/resolutions/IAU1938_French.pdf. $M_{\rm Bol}$ and $m_{\rm Bol}$ refer specifically to bolometric magnitudes defined using the zero points of this resolution.

[2] Modern spaceborne total solar irradiance (TSI) instruments are absolutely calibrated at the 0.03% level (Kopp 2014). The TIM/SORCE experiment established a lower TSI value than previously reported based on the fully characterized TIM instrument (Kopp et al. 2005, Kopp & Lean 2011). This revised TSI scale was later confirmed by PREMOS/PICARD, the first spaceborne TSI radiometer that was irradiance-calibrated in vacuum at the TSI Radiometer Facility (TRF) with SI-traceability prior to launch (Schmutz et al. 2013). The DIARAD/PREMOS (Meftah et al. 2015), ACRIM3/ACRIMSat (Willson 2014), VIRGO/SoHO, and TCTE/STP-Sat3 (http://lasp.colorado.edu/home/tcte/) flight instruments are now consistent with this new TSI scale within instrument uncertainties, with the DIARAD, ACRIM3, and VIRGO having made post-launch corrections and the TCTE having been validated on the TRF prior to its 2013 launch. The cycle 23 observations with these experiments are consistent with a TSI value (rounded to an appropriate number of significant digits) and uncertainty of: $S_\odot = 1361\,(\pm\,1)$ W m^{-2} (2σ uncertainty). The uncertainty range includes contributions from the absolute accuracies of the latest TSI instruments as well as uncertainties in assessing a secular trend in TSI over solar cycle 23 using older measurements. Combining this total solar irradiance value with the IAU 2012 definition of the astronomical unit leads to a current best estimate of the mean solar luminosity of $L_\odot = 4\,\pi\,(1\,\mathrm{au})^2\,S_\odot$ $= 3.8275\,(\pm\,0.0014) \times 10^{26}$ W. Based on this, a *nominal solar luminosity* of $\mathcal{L}_\odot^{\rm N} = 3.828 \times 10^{26}$ W is adopted. Using the proposed zero point $L_\circ$, the nominal solar luminosity $\mathcal{L}_\odot^{\rm N}$ corresponds to bolometric magnitude $M_{\rm Bol\odot} \simeq 4.739\,996\ldots$ mag — i.e., sufficiently close to 4.74 mag for any foreseeable practical purpose.

[3] The terms *irradiance* and *heat flux density* are used interchangeably, both with SI units of W m^{-2} (Wilkins 1989, Bureau International des Poids et Mesures 2006). See also https://www.iau.org/publications/proceedings_rules/units/.

[4] The parsec is defined as exactly $(648\,000/\pi)$ au (e.g. Cox 2000, Binney & Tremaine 2008). Using the IAU 2012 Resolution B2 definition of the astronomical unit, the parsec corresponds to $3.085\,677\,581\ldots \times 10^{16}$ m. As the absolute bolometric magnitude zero point and astronomical unit are defined exactly, further digits for the apparent bolometric magnitude zero point irradiance $f_\circ$ may be calculated if needed.

Resolution B3
on recommended nominal conversion constants for selected solar and planetary properties

Proposed by IAU Inter-Division A-G Working Group on Nominal Units for Stellar & Planetary Astronomy

The XXIXth International Astronomical Union General Assembly,

Recognizing

that notably different values of the solar mass, radius, luminosity, effective temperature, total solar irradiance, of the masses and radii of the Earth and Jupiter, and of the Newtonian constant of gravitation *G* have been used by researchers to express and derive fundamental stellar and planetary properties,

Noting

1. that neither the solar nor the planetary masses and radii are secularly constant and that their instantaneous values are gradually being determined more precisely through improved observational techniques and methods of data analysis, and
2. that the common practice of expressing the stellar and planetary properties in units of the properties of the Sun, the Earth, or Jupiter inevitably leads to unnecessary systematic differences that are becoming apparent with the

rapidly increasing accuracy of spectroscopic, photometric, and interferometric observations of stars and extrasolar planets[1], and

3. that the universal constant of gravitation G is currently one of the least precisely determined constants, whereas the error in the product $GM_\odot$ is five orders of magnitude smaller (Petit & Luzum 2010, and references therein),

Recommends

In all scientific publications in which **accurate** values of basic stellar or planetary properties are derived or quoted:

1. that whenever expressing stellar properties in units of the solar radius, total solar irradiance, solar luminosity, solar effective temperature, or solar mass parameter, that the nominal values $\mathcal{R}^{\rm N}_\odot$, $\mathcal{S}^{\rm N}_\odot$, $\mathcal{L}^{\rm N}_\odot$, $\mathcal{T}^{\rm N}_{\rm eff\odot}$, and $(\mathcal{GM})^{\rm N}_\odot$, be used, respectively, which are by definition *exact* and are expressed in SI units. These *nominal* values should be understood as conversion factors only — chosen to be close to the current best estimates (see table below) — not as the true solar properties. Their consistent use in all relevant formulas and/or model calculations will guarantee a uniform conversion to SI units. Symbols such as $L_\odot$ and $R_\odot$, for example, should only be used to refer to actual estimates of the solar luminosity and solar radius (with uncertainties),

2. that the same be done for expressing planetary properties in units of the equatorial and polar radii of the Earth and Jupiter (i.e., adopting nominal values $\mathcal{R}^{\rm N}_{e\rm E}$, $\mathcal{R}^{\rm N}_{p\rm E}$, $\mathcal{R}^{\rm N}_{e\rm J}$, and $\mathcal{R}^{\rm N}_{p\rm J}$, expressed in meters), and the nominal terrestrial and jovian mass parameters $(\mathcal{GM})^{\rm N}_{\rm E}$ and $(\mathcal{GM})^{\rm N}_{\rm J}$, respectively (expressed in units of $\rm m^3\,s^{-2}$). Symbols such as $\rm GM_E$, listed in the IAU 2009 system of astronomical constants (Luzum et al. 2011), should only be used to refer to actual estimates (with uncertainties),

3. that the IAU (2015) System of Nominal Solar and Planetary Conversion Constants be adopted as listed below:

SOLAR CONVERSION CONSTANTS		
$1\mathcal{R}^{\rm N}_\odot$	=	6.957×10^8 m
$1\mathcal{S}^{\rm N}_\odot$	=	$1361\ \rm W\,m^{-2}$
$1\mathcal{L}^{\rm N}_\odot$	=	3.828×10^{26} W
$1\mathcal{T}^{\rm N}_{\rm eff\odot}$	=	5772 K
$1(\mathcal{GM})^{\rm N}_\odot$	=	$1.327\,124\,4 \times 10^{20}\ \rm m^3 s^{-2}$

PLANETARY CONVERSION CONSTANTS		
$1\,\mathcal{R}^{\rm N}_{e\rm E}$	=	6.3781×10^{6} m
$1\,\mathcal{R}^{\rm N}_{p\rm E}$	=	6.3568×10^{6} m
$1\,\mathcal{R}^{\rm N}_{e\rm J}$	=	7.1492×10^{7} m
$1\,\mathcal{R}^{\rm N}_{p\rm J}$	=	6.6854×10^{7} m
$1\,(\mathcal{GM})^{\rm N}_{\rm E}$	=	$3.986\,004 \times 10^{14}$ m^3 s^{-2}
$1\,(\mathcal{GM})^{\rm N}_{\rm J}$	=	$1.266\,865\,3 \times 10^{17}$ m^3 s^{-2}

4. that an object's mass can be quoted in nominal solar masses $\mathcal{M}^{N}_{\odot}$ by taking the ratio $(GM)_{\rm object}/(\mathcal{GM})^{\rm N}_{\odot}$, or in corresponding nominal jovian and terrestrial masses, $\mathcal{M}^{\rm N}_{\rm J}$ and $\mathcal{M}^{\rm N}_{\rm E}$, respectively, dividing by $(\mathcal{GM})^{\rm N}_{\rm J}$ and $(\mathcal{GM})^{\rm N}_{\rm E}$. If SI masses are explicitly needed, they should be expressed in terms of $(GM)_{\rm object}/G$, where the estimate of the Newtonian constant G should be explicitly specified in the publication (for example, the 2014 CODATA value is $G = 6.67408\,(\pm 0.00031) \times 10^{-11}$ m^3 kg^{-1} s^{-2}).

5. that if nominal volumes are needed, that a nominal terrestrial volume be derived as $4\,\pi\,\mathcal{R}^{\rm N\,2}_{e\rm E}\,\mathcal{R}^{\rm N}_{p\rm E}/3$, and nominal jovian volume as $4\,\pi\,\mathcal{R}^{\rm N\,2}_{e\rm J}\,\mathcal{R}^{\rm N}_{p\rm J}/3$.

Explanation

1. The need for increased accuracy has led to a requirement to distinguish between Barycentric Coordinate Time (TCB) and Barycentric Dynamical Time (TDB). For this reason the *nominal solar mass parameter* $(\mathcal{GM})^{\rm N}_{\odot}$ value is adopted as an exact number, given with a precision within which its TCB and TDB values agree (Luzum et al. 2011). This precision is considered to be sufficient for most applications in stellar and exoplanetary research for the forseeable future.

2. The *nominal solar radius* $\mathcal{R}^{\rm N}_{\odot}$ corresponds to the solar photospheric radius measured by Haberreiter et al. (2008)[2], who resolved the long-standing discrepancy between the seismic and photospheric solar radii. This $\mathcal{R}^{\rm N}_{\odot}$ value is consistent with that adopted by Torres et al. (2010) in their recent compilation of updated radii of well observed eclipsing binary systems.

3. The *nominal total solar irradiance* $\mathcal{S}^{\rm N}_{\odot}$ corresponds to the mean total electromagnetic energy from the Sun, integrated over all wavelengths, incident

per unit area per unit time at distance 1 au — also measured contemporarily as the *total solar irradiance* (TSI; e.g., Willson 1978) and known historically as the *solar constant* (Pouillet 1838). $\mathcal{S}^{\rm N}_{\odot}$ corresponds to the solar cycle 23-averaged TSI ($S_{\odot} = 1361\,(\pm\,1)$ W m^{-2}; 2σ uncertainty; Kopp et al., in prep.)[3].

4. The *nominal solar luminosity* $\mathcal{L}^{\rm N}_{\odot}$ corresponds to the mean solar radiative luminosity rounded to an appropriate number of significant figures. The current (2015) best estimate of the mean solar luminosity $L_{\odot}$ was calculated using the solar cycle-averaged TSI[3] and the IAU 2012 definition of the astronomical unit[4].

5. The *nominal solar effective temperature* $\mathcal{T}^{\rm N}_{\rm eff\odot}$ corresponds to the effective temperature calculated using the current (2015) best estimates of the solar radiative luminosity and photospheric radius, and the CODATA 2014 value for the Stefan-Boltzmann constant[5], rounded to an appropriate number of significant figures.

6. The parameters $\mathcal{R}^{\rm N}_{e\rm E}$ and $\mathcal{R}^{\rm N}_{p\rm E}$ correspond respectively to the Earth's "zero tide" equatorial and polar radii as adopted following 2003 and 2010 IERS Conventions (McCarthy & Petit 2004; Petit & Luzum 2010), the IAU 2009 system of astronomical constants (Luzum et al. 2011), and the IAU Working Group on Cartographic Coordinates and Rotational Elements (Archinal et al. 2011). If equatorial vs. polar radius is not explicitly specified, it should be understood that *nominal terrestrial radius* refers specifically to $\mathcal{R}^{\rm N}_{e\rm E}$, following common usage.

7. The parameters $\mathcal{R}^{\rm N}_{e\rm J}$ and $\mathcal{R}^{\rm N}_{p\rm J}$ correspond respectively to the one-bar equatorial and polar radii of Jupiter adopted by the IAU Working Group on Cartographic Coordinates and Rotational Elements 2009 (Archinal et al. 2011). If equatorial vs. polar radius is not explicitly specified, it should be understood that *nominal jovian radius* refers specifically to $\mathcal{R}^{\rm N}_{e\rm J}$, following common usage.

8. The *nominal terrestrial mass parameter* $(\mathcal{GM})^{\rm N}_{\rm E}$ is adopted from the IAU 2009 system of astronomical constants (Luzum et al. 2011), but rounded to the precision within which its TCB and TDB values agree. The *nominal jovian mass parameter* $(\mathcal{GM})^{\rm N}_{\rm J}$ is calculated based on the mass parameter for the Jupiter system from the IAU 2009 system of astronomical constants

(Luzum et al. 2011), subtracting off the contribution from the Galilean satellites (Jacobson et al. 2000). The quoted value is rounded to the precision within which the TCB and TDB values agree, and the uncertainties in the masses of the satellites are negligible.

9. The nominal value of a quantity Q can be transcribed in LaTeX with the help of the definitions listed below for use in the text and in equations:

```
\newcommand{\Qnom}{\hbox{$\mathcal{Q}^{\rm N}_{\odot}$}}
\newcommand{\Qn}{\mathcal Q^{\rm N}_{\odot}}
```

References

Archinal, B. A., A'Hearn, M. F., Bowell, E., et al. 2011, Celestial Mechanics and Dynamical Astronomy 109, 101

Haberreiter, M., Schmutz, W., Kosovichev, A. G. 2008, ApJ, 675, L53

Harmanec, P., Prša, A. 2011, PASP, 123, 976

Jacobson, R. A., Haw, R. J., McElrath, T. P., & Antreasian, P. G. 2000, J. Astronaut. Sci. 48(4), 495

Kopp, G. 2014, Journal of Space Weather and Space Climate, 4, A14

Kopp, G., Lawrence, G., Rottman, G., 2005, Solar Physics, 230, 129

Kopp, G., & Lean, J. L. 2011, Geophys. Res. Letters, 38, L01706

Luzum, B., Capitaine, N., Fienga, A., et al. 2011, Celestial Mechanics and Dynamical Astronomy, 110, 293

McCarthy, D. D. & Petit, G. 2004 IERS Technical Note No. 32, 1

Meftah, M., Irbah, A., Hauchecorne, A., et al. 2015, Solar Physics, 290, 673

Petit, G., Luzum, B. (Eds.) 2010 IERS Technical Note No. 36

Pouillet, C. S. M. 1838, *Memoire sur le chaleur solaire*, Paris, Bachelier

Prša, A. & Harmanec, P. 2012, Proc. IAU Symp. 282, Cambridge Univ., Press, 339

Schmutz W., Fehlmann A., Finsterle W., et al. 2013, AIP Conf. Proc. 1531, p. 624627, doi:10.1063/1.4804847

Torres, G., Andersen, J., Giménez, A. 2010, A&A Rev., 18, 67

Willson, R. C. 2014, Astrophysics & Space Science, 352, 341

Willson, R. C. 1978, Journal of Geophysical Research, 83, 4003

Notes

[1] Note, e.g., that since projected rotational velocities of stars ($v \sin i$) are measured in SI units, the use of different values for the solar radius can lead to measurable differences in the rotational periods of giant stars (see Harmanec and Prša 2011).

[2] Haberreiter et al. (2008) measured the solar photospheric radius to be 695 658 (± 140) km. The adopted $\mathcal{R}^{\rm N}_{\odot}$ is based on this value, quoting an appropriate number of significant figures given the uncertainty, and differs slightly from the nominal solar radius tentatively proposed by Harmanec & Prša (2011) and Prša & Harmanec (2012).

[3] The TSI is variable at the ~0.08% (~1 W m^{-2}) level and may be variable at slightly larger amplitudes over timescales of centuries. Modern spaceborne TSI instruments are absolutely calibrated at the 0.03% level (Kopp 2014). The TIM/SORCE experiment established a lower TSI value than previously reported based on the fully characterized TIM instrument (Kopp et al. 2005, Kopp & Lean 2011). This revised TSI scale was later confirmed by PREMOS/PICARD, the first spaceborne TSI radiometer that was irradiance-calibrated in vacuum at the TSI Radiometer Facility (TRF) with SI-traceability prior to launch (Schmutz et al. 2013). The DIARAD/PREMOS (Meftah et al. 2015), ACRIM3/ACRIMSat (Willson 2014), VIRGO/SoHO, and TCTE/STP-Sat3 (http://lasp.colorado.edu/home/tcte/) flight instruments are now consistent with this new TSI scale within instrument uncertainties, with the DIARAD, ACRIM3, and VIRGO having made post-launch corrections and the TCTE having been validated on the TRF prior to its 2013 launch. The Cycle 23 observations with these experiments are consistent with a mean TSI value of $S_{\odot} = 1361$ W m^{-2} (± 1 W m^{-2}; 2σ). The uncertainty range includes contributions from the absolute accuracies of the latest TSI instruments as well as uncertainties in assessing a secular trend in TSI over solar cycle 23 using older measurements.

[4] Resolution B2 of the XXVIII General Assembly of the IAU in 2012 defined the astronomical unit *to be a conventional unit of length equal to 149 597 870 700 m exactly*. Using the current best estimate of the TSI (discussed in endnote 3), this is consistent with a current best estimate of the Sun's mean radiative luminosity of $L_{\odot} = 4\pi\,(1\,\mathrm{au})^2\,S_{\odot} = 3.8275\,(\pm\,0.0014) \times 10^{26}$ W.

[5] The CODATA 2014 value for the Stefan-Boltzmann constant is $\sigma = 5.670\,367\,(\pm\,0.000\,013) \times 10^{-8}$ W m^{-2} K^{-4}. The current best estimate for the solar effective temperature is calculated to be $T_{\mathrm{eff},\odot} = 5772.0\,(\pm\,0.8)$ K.

RESOLUTION B4

Protection of Radio Astronomy Observations in the Frequency Range 76 - 81 GHz from Interference Caused by Automobile Radars.

Proposed by IAU Commission 40 (Radio Astronomy)

The XXIX General Assembly of the International Astronomical Union,

recognizing

1. that the International Astronomical Union is a Sector Member of the Radiocommunication Sector of the International Telecommunication Union (ITU-R),

2 that radio astronomy observations are protected in their allocated bands from interference caused by active radio services by national regulations based on the Radio Regulations (RR) adopted by the International Telecommunication Union (ITU),

3. that the frequency ranges 76 – 77.5 GHz and 79 – 81 GHz are allocated to the radio astronomy service on a primary basis (Article 5 of the RR),

4. that Article 29.9 of the RR states that “In providing protection from interference to the radio astronomy service on a permanent or temporary basis, administrations shall use appropriate means such as geographical separation, site shielding, antenna directivity and the use of time-sharing and the minimum practicable transmitter power”;

considering

1. that radio astronomy observations consist of the reception of extremely weak signals from cosmic sources,

2. that radio astronomy receivers have exceptionally high sensitivity, which results in high susceptibility to interference caused by man-made radio signals,

3. that radio frequencies are a limited resource that should be shared,

4. that automobile manufacturers intend to utilize millimeter-wave radars operating in the frequency range 76 - 81 GHz for a number of purposes, that include the increasing of safety in driving,

5. that agenda item 1.18 of World Radiocommunication Conference 2015 (WRC-15) of the ITU calls for consideration of allocating the frequency range 77.5 – 78 GHz to radar applications worldwide, and that this allocation is expected to be applied worldwide in conjunction with existing allocations to radar applications in the frequency range 76 – 81 GHz,

6. that the ITU has not identified measures to protect radio astronomy observations in the frequency range 76– 81 GHz from interference caused by automobile radars.

Resolves

1. to request that WRC-15 take all possible steps to protect radio astronomy observations in the range 76 – 81 GHz from interference caused by automobile radars,

2. to express the view that the most effective protection of radio astronomy observations would be through geographical separation,

3. to send a copy of this resolution to administrations that operate or host radio astronomy observations in the frequency range 76 – 81 GHz, and where automobile radars are operating or plan to operate in the same frequency range,

4. to encourage astronomers, particularly those in countries that fall under Resolves 3, to work proactively in protecting radio astronomy observations in the frequency range 76 – 81 GHz.