Can Physics Benefit from a New Concept of Time?

Markolf H. Niemz [ID] *

Heidelberg University, Theodor-Kutzer-Ufer 1–3, 68167 Mannheim, Germany

(Dated: June 25, 2023)

TABLE I. Summary of the data displayed in Fig. 6 including the uncertainties in z and μ.

SN	z	σ_z	μ	σ_μ	D (pc)	v_{3D}/c	v'_{3D}/c
1990O	0.030	0.002	35.90	0.20	1.514E8	0.0296	0.0299
1990af	0.050	0.002	36.84	0.21	2.333E8	0.0488	0.0496
1992P	0.026	0.002	35.64	0.20	1.343E8	0.0257	0.0259
1992ae	0.075	0.002	37.77	0.19	3.581E8	0.0722	0.0741
1992ag	0.026	0.002	35.06	0.24	1.028E8	0.0257	0.0259
1992al	0.014	0.002	34.12	0.25	6.668E7	0.0139	0.0140
1992aq	0.101	0.002	38.73	0.20	5.572E8	0.0959	0.0998
1992bc	0.020	0.002	34.96	0.22	9.817E7	0.0198	0.0199
1992bg	0.036	0.002	36.17	0.19	1.714E8	0.0354	0.0358
1992bh	0.045	0.002	36.97	0.18	2.477E8	0.0440	0.0448
1992bl	0.043	0.002	36.53	0.19	2.023E8	0.0421	0.0427
1992bo	0.018	0.002	34.70	0.23	8.710E7	0.0178	0.0179
1992bp	0.079	0.002	37.94	0.18	3.873E8	0.0759	0.0780
1992br	0.088	0.002	38.07	0.28	4.111E8	0.0841	0.0866
1992bs	0.063	0.002	37.67	0.19	3.420E8	0.0610	0.0625
1993B	0.071	0.002	37.78	0.19	3.597E8	0.0685	0.0703
1995ar	0.465	0.005	42.81	0.22	3.648E9	0.3643	0.4896
1995as	0.498	0.001	43.21	0.24	4.385E9	0.3835	0.5540
1995aw	0.400	0.030	42.04	0.19	2.559E9	0.3243	0.3953
1995ax	0.615	0.001	42.85	0.23	3.715E9	0.4457	0.6029
1995ay	0.480	0.001	42.37	0.20	2.979E9	0.3731	0.4717
1995ba	0.388	0.001	42.07	0.19	2.594E9	0.3166	0.3871
1996cf	0.570	0.010	42.77	0.19	3.581E9	0.4228	0.5647
1996cg	0.490	0.010	42.58	0.19	3.281E9	0.3789	0.4922
1996ci	0.495	0.001	42.25	0.19	2.818E9	0.3818	0.4759
1996cl	0.828	0.001	43.96	0.46	6.194E9	0.5393	0.9540
1996cm	0.450	0.010	42.58	0.19	3.281E9	0.3554	0.4617
1997F	0.580	0.001	43.04	0.21	4.055E9	0.4280	0.5982
1997H	0.526	0.001	42.56	0.18	3.251E9	0.3992	0.5172
1997I	0.172	0.001	39.79	0.18	9.078E8	0.1574	0.1681
1997N	0.180	0.001	39.98	0.18	9.908E8	0.1640	0.1763
1997P	0.472	0.001	42.46	0.19	3.105E9	0.3684	0.4710
1997Q	0.430	0.010	41.99	0.18	2.500E9	0.3432	0.4162
1997R	0.657	0.001	43.27	0.20	4.508E9	0.4660	0.6816
1997ac	0.320	0.010	41.45	0.18	1.950E9	0.2707	0.3136
1997af	0.579	0.001	42.86	0.19	3.733E9	0.4275	0.5792
1997ai	0.450	0.010	42.10	0.23	2.630E9	0.3554	0.4358
1997aj	0.581	0.001	42.63	0.19	3.357E9	0.4285	0.5606
1997am	0.416	0.001	42.10	0.19	2.630E9	0.3345	0.4102
1997ap	0.830	0.010	43.85	0.19	5.888E9	0.5401	0.9205

Further explanation of each column on the next page.

Col. 1. IAU name assigned to the supernova.
Col. 2. Redshift z according to Ref. [25].
Col. 3. Uncertainty in z according to Ref. [25].
Col. 4. Distance modulus μ according to Ref. [28].
Col. 5. Uncertainty in μ according to Ref. [28].
Col. 6. Distance D in parsec calculated from $D = 10^{0.2\mu+1}$.
Col. 7. v_{3D}/c calculated from Eq. (28).
Col. 8. v'_{3D}/c calculated from Eq. (29).

ESTIMATION OF H_0^*.

$$\mu = 2.39 \ln\left(v'_{3D}/c \right) + 44$$

$$5 \log D - 5 = 2.39 \ln\left(v'_{3D}/c \right) + 44$$

$$\ln D / \ln 10 = 0.478 \ln\left(v'_{3D}/c \right) + 9.8$$

$$\ln D = 1.1 \ln\left(v'_{3D}/c \right) + 22.6$$

$$D \approx \left(v'_{3D}/c \right) \times 6.31E9$$

$$v'_{3D} \approx D \times 0.048 \text{ m/s/pc}$$

$$H_0^* \approx 48 \text{ km/s/Mpc}$$