Indication from the Supernovae Ia Data of a Stationary Background Universe

Peter Ostermann

With redshift parameters *z* independent of time and a constant universal speed of light *c = *c* the simplest cosmological solution of General Relativity stands out from all others.** Implying Euclidean space on large scales it is free of horizon problems, and requires a negative 'dark' gravitational pressure of -1/3 the critical density.

This stationary model (SUM) - not the 'Steady-state'-Theory, though, and anything but static - may describe the background universe on ultra-large scales, embedding our evolutionary cosmos therein.

It turns out to represent the SNe-Ia data of Riess et al. 2004/07 [1], [2] in the high redshift range $z > 0.1$ surprisingly well. Only in the low redshift range $0.01 < z \leq 0.1$ its luminosity predictions differ from those of today's Cosmological Concordance Model (CCM) significantly.

This talk will show how, instead of acceleration, a local Hubble contrast of about 7 ± 2 % as reported by Jha, Riess, Kirshner 2007 [3] seems to result in reasonable agreement with the low redshift data, too.

The SNe Ia data compilation of Riess *et al*. 2004/07

Data structure: [sorting-nr., z, m-M, g/G/a/s/S, SN-name]

[1, .104e-1, 33.56, g, `1999cp`], [2, .104e-1, 33.21, g, `1998bp`], [3, .104e-1, 33.73, g, `1997do`], [4, .116e-1, 32.96, s, `1995E`], [5, .121e-1, 34.05, s, `1999da`], [6, .132e-1, 34.02, g, 1997.], [7, .136e-1, 33.73, g, `1999dq`],
[8, .141e-1, 34.43, g, `1999dk`], [9, .141e-1, 34.12, g, `1992al`], [10, .141e-1, 34.13, g, `1991ag`], [11, .152e-1, 34.11, g, `1995bd`], [12, .157e-1, 34.58, g, `1999aa`], [13, .161e-1, 34.50, g, `1994S`], [14, .162e-1, 34.13, g, `2001V`],
[15, .164e-1, 34.41, g, `2000dk`], [16, .164e-1, 34.47, s, `2000ce`], [17, .165e-1, 33.82, g, `1996bo`], [18, .166e-1, 34.54, g, `1997Y`], [19, .167e-1, 34.21, g, `1996bv`], [20, .170e-1, 34.18, g, `1998ef`], [21, .170e-1, 34.47, g, `1998V`],
[22, .171e-1, 34.68, g, `1998co`], [23, .175e-1, 34.52, g, `1997cn`], [24, .178e-1, 34.70, g, `1992bo`], [25, .180e-1, 34.29, g, `1993ae`], [26, .186e-1, 34.96, g, `1992bc`], [27, .193e-1, 34.59, g, `2000B`], [28, .218e-1, 35.06, g, `2000fa`],
[29, .219e-1, 34.70, g, `1995ak`], [30, .233e-1, 35.14, g, `2000cn`], [31, .234e-1, 35.36, g, `1998eg`], [32, .244e-1, 35.09, g, `1994M`], [33, .247e-1, 35.33, s, `1996V`], [34, .251e-1, 35.09, g, `1993H`], [35, .257e-1, 35.41, g, `1999X`],
[36, .260e-1, 35.62, g, `1999gp`], [37, .262e-1, 35.06, g, `1992ag`], [38, .265e-1, 35.64, g, `1992P`], [39, .266e-1, 35.36, g, `2000bk`], [40, .276e-1, 35.90, g, `1996C`], [41, .286e-1, 35.53, g, `1993ah`], [42, .290e-1, 35.70, g, `1994Q`],
[43, .297e-1, 36.12, g, `1997dg`], [44, .307e-1, 35.90, g, `1990O`], [45, .316e-1, 35.85, g, `1999cc`], [46, .327e-1, 36.08, g, `1998cs`], [47, .331e-1, 35.54, g, `1991U`], [48, .348e-1, 36.17, g, `1996bl`], [49, .360e-1, 36.39, g, `2000cf`],
[50, .360e-1, 36.01, g, `1994T`], [51, .36e-1, 36.17, g, `1992bg`], [52, .380e-1, 36.67, g, `1999ef`], [53, .4e-1, 36.38, g, `1990T`], [54, .430e-1, 36.53, g, `1992bl`], [55, .450e-1, 36.97, g, `1992bh`], [56, .460e-1, 36.35, g, `1992J`],
[57, .490e-1, 36.52, g, `1995ac`], [58, .490e-1, 36.90, g, `1993ac`], [59, .50e-1, 37.08, g, `1993ag`], [60, .5e-1, 36.84, g, `1990af`], [61, .51e-1, 36.67, s, `1994C`], [62, .52e-1, 37.16, g, `1993O`], [63, .53e-1, 36.97, g, `1998dx`],
[64, .53e-1, 37.17, s, `1995M`], [65, .560e-1, 37.31, g, `1991S`], [66, .58e-1, 37.13, g, `1992bk`], [67, .61e-1, 37.20, g, `1992au`], [68, .63e-1, 37.67, g, `1992bs`], [69, .67e-1, 37.54, s, `1995ae`], [70, .71e-1, 37.78, g, `1993B`],
[71, .75e-1, 37.77, g, `1992ae`], [72, .79e-1, 37.94, g, `1992bp`], [73, .88e-1, 38.07, g, `1992br`], [74, .89e-1, 38.50, s, `1994B`], [75, .101, 38.73, g, `1992aq`], [76, .124, 39.20, g, `1996ab`], [77, .160, 39.08, s, `1996R`],
[78, .172, 39.79, g, `1997I`], [79, .180, 39.98, g, `1997N`], [80, .216, 40.33, S, `2002kc`], [81, .230, 40.44, s, `1995ap`], [82, .240, 40.68, s, `1996T`], [83, .249, 40.761, a, SNLS_03D3bh], [84, .263, 40.872, a, SNLS_04D3ez],
[85, .278, 41.00, g, `1999fw`], [86, .285, 40.921, a, SNLS_03D4ag], [87, .300, 41.01, g, `1996J`], [88, .300, 40.67, s, `1995ao`], [89, .320, 41.45, g, `1997ac`], [90, .331, 41.136, a, SNLS_03D1fc], [91, .334, 40.92, g, `1997bj`],
[92, .337, 41.449, a, SNLS_04D3kr], [93, .340, 41.513, a, SNLS_04D3nh], [94, .340, 40.71, g, `2001iw`], [95, .357, 41.631, a, SNLS_04D2fs], [96, .358, 41.664, a, SNLS_04D3fk], [97, .359, 41.23, S, HST04Kur],
[98, .369, 41.675, a, SNLS_04D2cf], [99, .369, 41.62, s, `1999fh`], [100, .371, 41.678, a, SNLS_03D3ay], [101, .380, 42.02, g, `1996K`], [102, .3880, 42.07, g, `1995ba`], [103, .397, 40.89, g, `2001iv`], [104, .400, 42.04, g, `1995aw`],
[105, .415, 41.962, a, SNLS_04D2fp], [106, .416, 42.10, g, `1997am`], [107, .420, 40.79, s, `2000ea`], [108, .420, 41.76, g, `1997bh`], [109, .422, 42.02, s, `2002ab`], [110, .425, 41.70, g, `1996E`], [111, .430, 41.966, a, SNLS_04D2gb],
[112, .430, 42.36, g, `1998ba`], [113, .430, 41.99, g, `1997Q`], [114, .430, 42.33, g, `1996U`], [115, .440, 42.08, g, `1997ce`], [116, .440, 42.57, g, `1997aw`], [117, .449, 42.056, a, SNLS_03D3aw], [118, .450, 42.10, g, `1997ai`],
[119, .450, 42.58, s, `1996cm`], [120, .450, 42.13, g, `1995az`], [121, .455, 42.29, g, `1999ff`], [122, .460, 42.23, G, HST04Yow], [123, .460, 42.56, g, `1999Q`], [124, .460, 41.83, g, `1998ac`], [125, .461, 42.221, a, SNLS_03D3cd],
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[140, .496, 42.370, a, SNLS_03D1ax], [141, .498, 43.21, s, `1995as`], [142, .500, 42.75, g, `2000dz`], [143, .500, 42.75, g, `1999U`], [144, .500, 42.74, g, `1997cj`], [145, .504, 42.619, a, SNLS_03D1au], [146, .508, 41.64, g, `1997as`],
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[167, .582, 43.071, a, SNLS_03D1aw], [168, .592, 42.752, a, SNLS_03D4gg], [169, .604, 42.705, a, SNLS_03D4dy], [170, .610, 42.986, a, SNLS_04D3do], [171, .613, 43.151, a, SNLS_04D4an], [172, .615, 42.85, g, `1995ax`],
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[179, .638, 43.30, s, `1998ay`], [180, .64, 43.01, G, `2003be`], [181, .643, 43.213, a, SNLS_04D3cy], [182, .644, 42.78, s, `1998be`], [183, .657, 43.27, g, `1997R`], [184, .67, 43.19, G, `2003bd`], [185, .679, 43.588, a, SNLS_03D1co],
[186, .688, 43.236, a, SNLS_03D1fl], [187, .695, 43.213, a, SNLS_03D4cz], [188, .698, 43.33, s, `2001jb`], [189, .707, 43.427, a, SNLS_04D2gp], [190, .710, 43.05, g, `2001ix`], [191, .719, 43.22, s, `2002P`],
[192, .730, 43.477, a, SNLS_04D3fq], [193, .735, 43.14, G, `2002kd`], [194, .740, 43.38, G, HST04Rak], [195, .740, 43.35, g, `1998bi`], [196, .756, 43.643, a, SNLS_04D3oe], [197, .771, 43.12, g, `2001fo`],
[198, .778, 43.81, g, `1997ez`], [199, .791, 43.543, a, SNLS_03D4fd], [200, .798, 43.88, g, `2001hx`], [201, .800, 43.680, a, SNLS_03D1fq], [202, .811, 44.140, a, SNLS_04D4dm], [203, .811, 43.97, g, `2001hy`],
[204, .815, 44.09, g, `2001jf`], [205, .815, 43.76, g, `1999fj`], [206, .822, 43.734, a, SNLS_04D3lu], [207, .828, 43.61, g, `1998J`], [208, .828, 43.96, g, `1996cl`], [209, .830, 43.85, g, `1997ap`], [210, .832, 43.55, g, `2001hs`],
[211, .839, 43.45, G, HST05Spo], [212, .840, 43.67, G, `2003eq`], [213, .854, 43.96, G, HST04Man], [214, .860, 44.03, g, `1997ek`], [215, .870, 44.285, a, SNLS_03D1cm], [216, .873, 43.75, g, `2001fs`], [217, .882, 43.90, g, `2001hu`],
[218, .884, 44.23, g, `2001jh`], [219, .886, 42.91, g, `1998I`], [220, .900, 43.64, G, `2003eb`], [221, .905, 43.898, a, SNLS_03D4di], [222, .935, 43.97, G, `2003lv`], [223, .935, 43.99, s, `2001kd`], [224, .949, 43.697, a, SNLS_03D4cx],
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[238, 1.056, 44.25, g, `1999fk`], [239, 1.120, 44.67, G, HST05Gab], [240, 1.140, 44.44, G, HST04Gre], [241, 1.140, 44.71, G, `2002ki`], [242, 1.190, 43.64, S, HST05Red], [243, 1.19, 44.19, g, `1999fv`],
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[250, 1.340, 44.92, G, `2003dy`], [251, 1.37, 45.23, G, HST04Mcg], [252, 1.390, 44.90, G, HST04Sas], [253, 1.40, 45.28, S, `2002fx`], [254, 1.551, 45.07, S, `2003ak`], [255, 1.755, 45.35, G, `1997ff`];

g/s ≡ gold/silver ground-discovered, G/S ≡ Gold/Silver HST-discovered, a ≡ SNLS-data of Astier *et al.* (2007)
Adopted value H_0 = 65 km/s/Mpc (arbitrarily chosen by Riess *et al.* 2004/2007)
Since based on the same constants *H*, *M*, and the same algorithms, only the original Riess-*et-al*. gold-sample is used here.
These are 140 ground-discovered plus 30 HST-discovered gold SNe-Ia (the remaining 11 HST-Silver data for illustration).

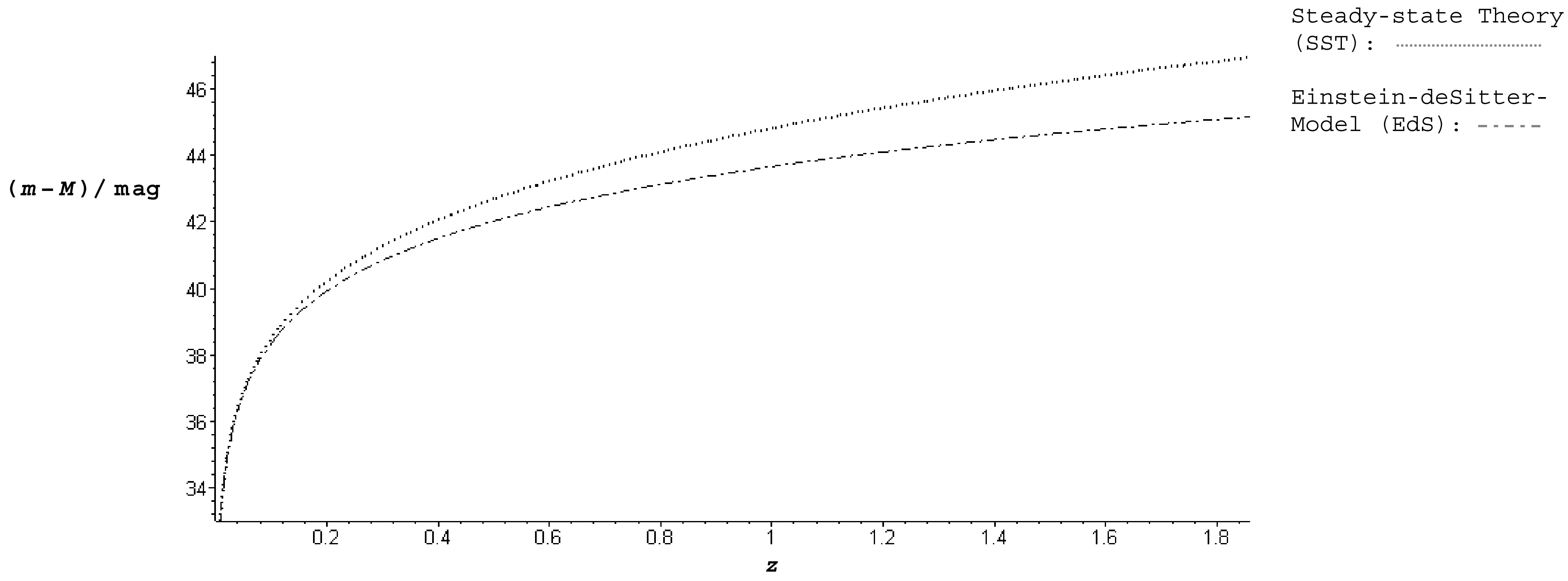


Fig. **1**

These are the magnitude-redshift predictions of two flat space models once prominent in the history of relativistic cosmology: The Steady-state Theory (SST) at the top and the Einstein-deSitter (EdS) model below it. But then ...

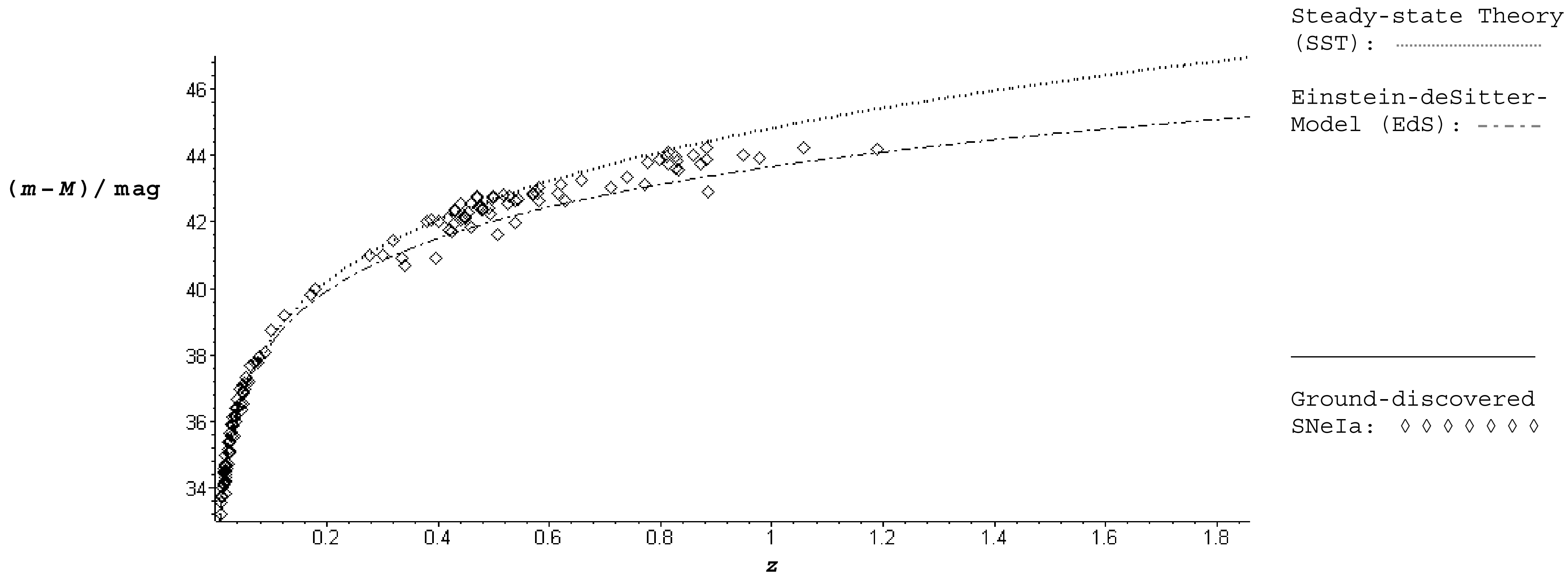


***Fig.* 2**

**... ten years ago it happened an observational breakthrough,
at first to the ground-discovered SNe-Ia data shown here as black diamonds.
They seemed to require a 'strange recipe' because ...**

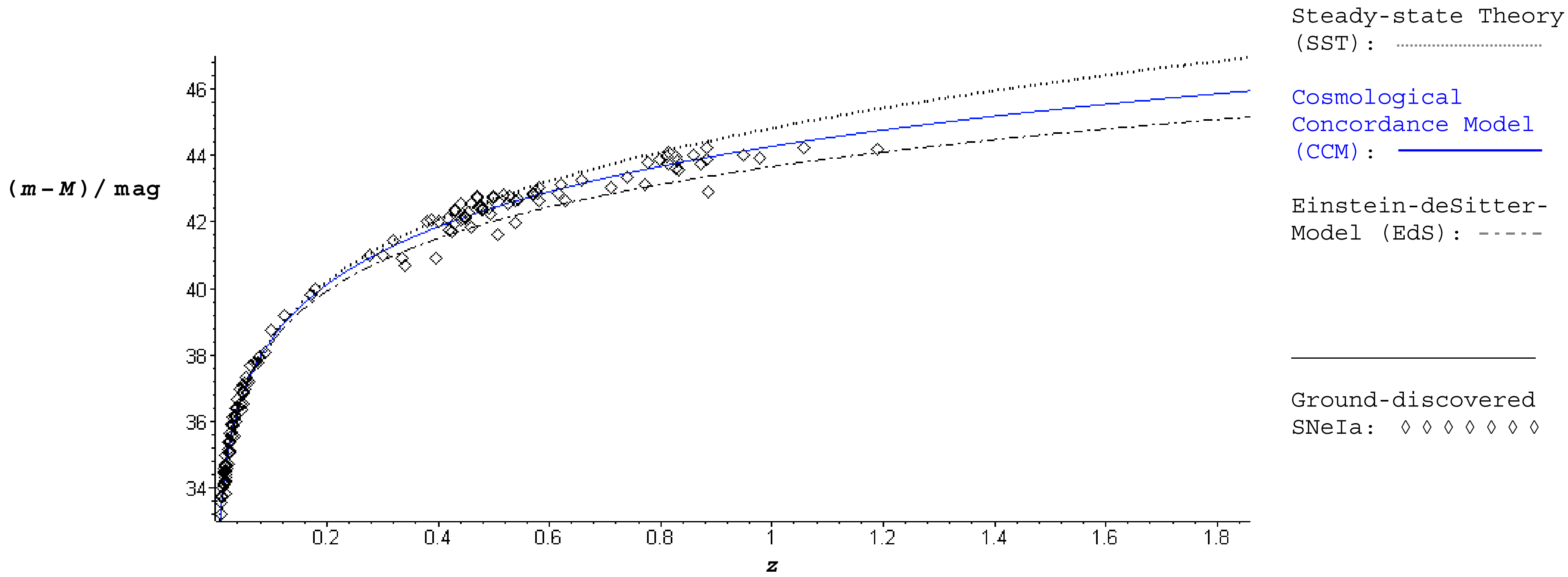


***Fig.* 3**

... mixing about 2/3 of the old Steady-state Theory to about 1/3 of the Einstein-deSitter cosmology led to today's Cosmological Concordance Model (CCM) which is represented by the blue line above fitting the SNe-Ia data numerically well.

Neglecting radiation in this context and setting the phenomenological pressure of matter $p_M = 0$, Einstein's equations extended by his cosmological term Λg_{ik}, yield the CCM distance modulus

$$m_{\mathrm{CCM}} - M \;=\; 5\log\left[(1+z)\int_0^z \frac{\mathrm{d}z'}{\sqrt{(1-\Omega_\Lambda)\,(1+z')^3+\Omega_\Lambda}}\right] + 25 + 5\log\left(\frac{c/H}{\mathrm{Mpc}}\right) \qquad (1)$$

where t' is the Robertson-Walker (RW) coordinate time, $\Omega_\Lambda \equiv \rho_\Lambda/\rho_c \approx 0.71$ (Riess *et al.* best fit) with ρ_c the critical density and $\rho_M + \rho_\Lambda = \rho_c$ for a spatially Euclidean model.

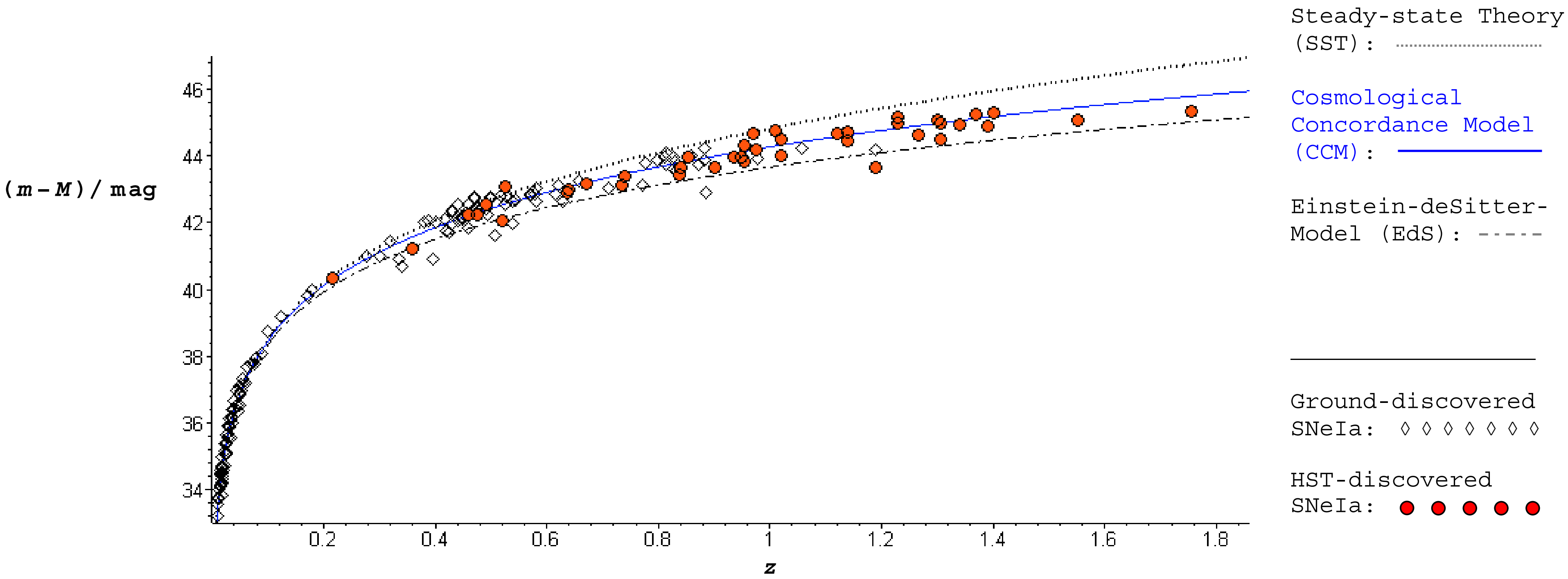


***Fig.* 4**

Up to highest z (= 1.755) also the HST-discovered SNe-Ia fitted in with the picture perfectly. Altogether, the unexpected data of the Supernova Cosmology Project (Perlmutter *et al.* [4]) and the High-Z Team (Riess *et al.* [5]) were understood to provide 'evidence' for a universal acceleration driven by dark energy. But there is another chance, in fact for a universe without unnecessary coincidences, horizon problems or other peculiarities ...

The Stationary Universe Model (SUM) - only those formulae which are used here

Postulate I - The universe is stationary, homogeneous, and isotropic, though on scales large enough only.
Postulate II - Except for deviations caused by local inhomogeneities the universal speed of light is constant.

The solution is

$$\mathrm{d}\sigma^{*2}_{\mathrm{SUM}} = \mathrm{e}^{2Ht^*}\mathrm{d}\sigma^{*2}_{\mathrm{SRT}} = \mathrm{e}^{2Ht^*}\left(c^2\mathrm{d}t^{*2} - \mathrm{d}l^{*2}\right) \quad . \tag{2}$$

Because of the exponential time scalar e^{Ht^*}, all relative temporal changes depend on *differences* $\Delta t^* = t^* - t_0^*$ solely. No special point t_0^* of the universal time scale is preferred.

Taking into account the universal light time $\Delta t^* = l^*/c$, the usual definition $z \equiv \lambda_{\mathrm{observed}}/\lambda_{\mathrm{emitted}} - 1$ leads to redshift parameters independent of time:

$$z = \mathrm{e}^{Hl^*/c} - 1 \quad . \tag{3}$$

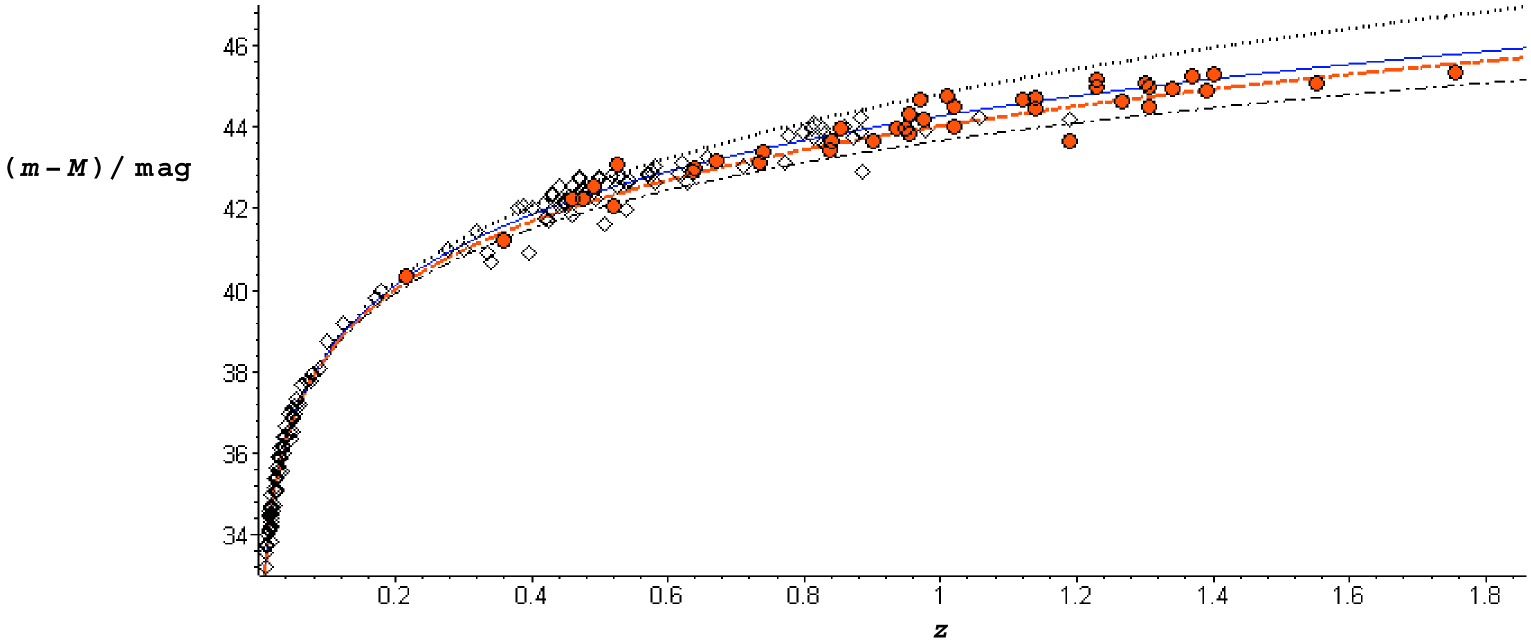
This applies to galaxies statistically at rest with respect to the CMB i.e. l^* = constant [an '*' always means universal ('comoving') coordinates]. **The apparent luminosity turns out to be**

$$I(z) = \frac{LH^2}{4\pi c^2}\left[(1+z)\ln(1+z)\right]^{-2} , \tag{4}$$

here $L \equiv 4\pi I d_{\mathrm{L}}^2$ is the absolute luminosity of a radiation source. **To compare this result with the SNe-Ia data and the CCM-prediction (1) immediately, it may be converted to the SUM distance modulus**

$$m_{\mathrm{SUM}} - M = 5\log\left[(1+z)\ln(1+z)\right] + 25 + 5\log\left(\frac{c/H}{\mathrm{Mpc}}\right) \quad . \tag{5}$$

The clear stationarity and other relevant features of this background model as e.g. its necessarily negative dark *gravitational* pressure will be discussed tomorrow.



Steady-state Theory (SST) : ....

Cosmological Concordance Model (CCM) : ———

Stationary Universe Model (SUM) : ----

Einstein-deSitter-Model (EdS) : -----

Ground-discovered SNeIa: ◊ ◊ ◊ ◊ ◊ ◊ ◊

HST-discovered SNeIa: ● ● ● ● ●

***Fig.* 5**

Inserting the red line of the SUM-prediction shows:
Evidently the SUM does fit the data much better than EdS or SST.
However ...

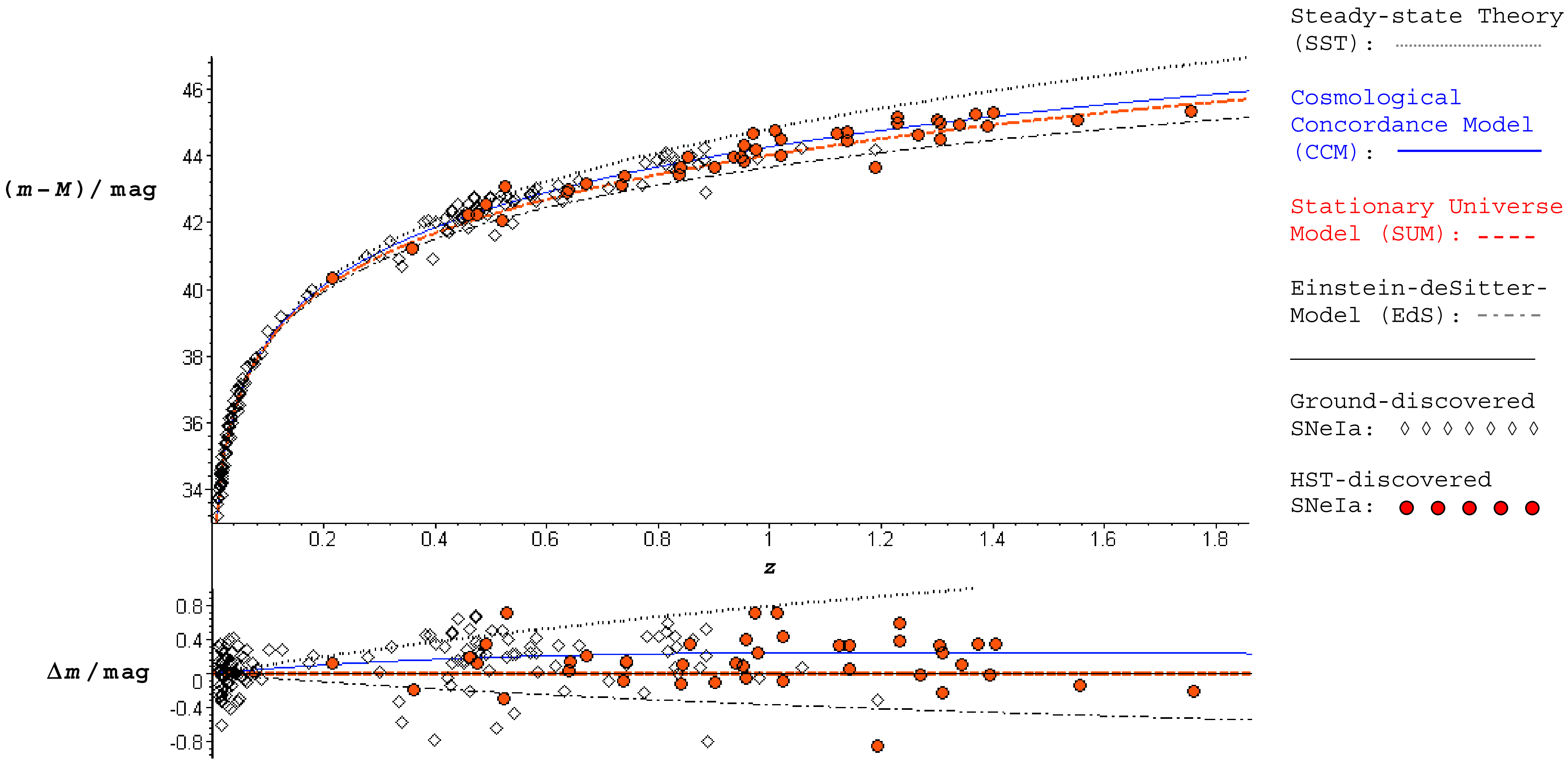


Fig. **6**

... since the blue CCM-line is a best-fit of the SNe-Ia data and their Δ*m*-residuals, the lower panel seemingly shows a disappointing deviation for the red SUM-line here. This is why such a model has not been taken seriously so far. Though, in my view, the upper panel strongly suggests a small vertical shift to the blue CCM-line ...

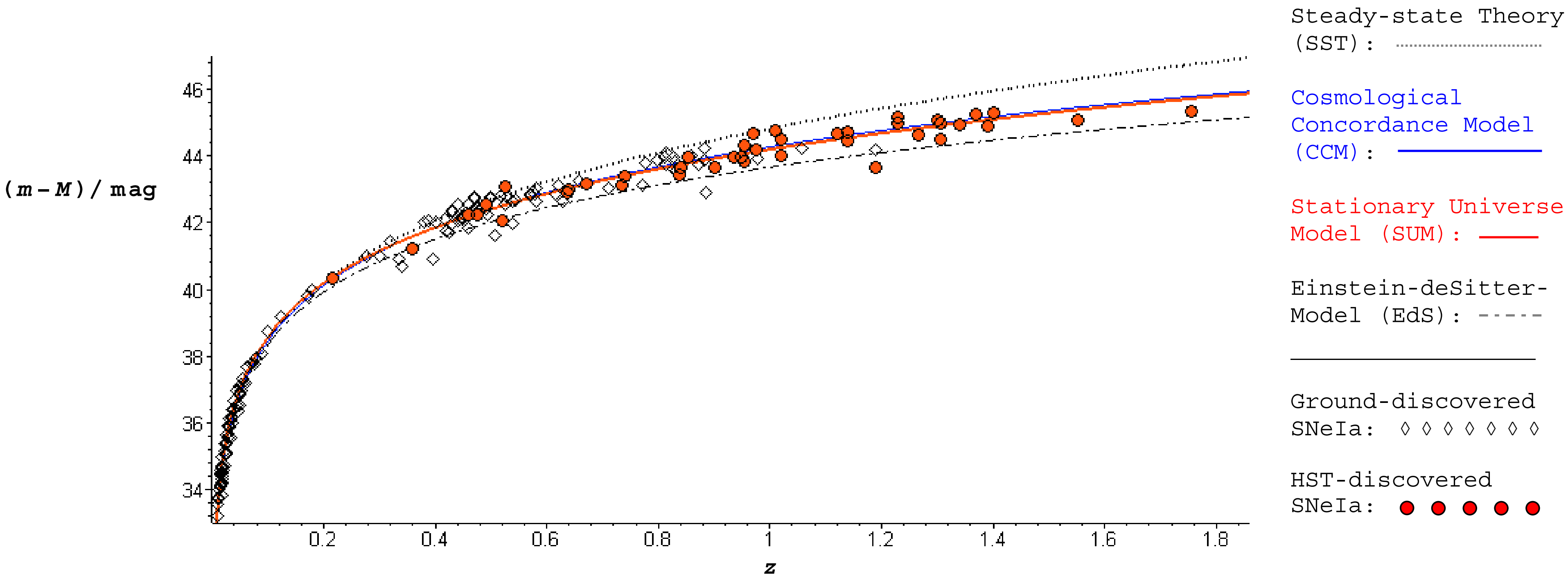


Fig. **7**

... and indeed, a vertical shift of Δm = 0.17 is sufficient
to remove all *visible* differences
of the red SUM-line and the blue CCM-line in this diagram.
This vertical shift does mean nothing but a reduction of about 9% in the Hubble constant
(if for example H_{CCM} = 71 km/s/Mpc then H_{SUM} = 65 km/s/Mpc).
But now there are some *hidden* differences which come to light by plotting the new residuals ...

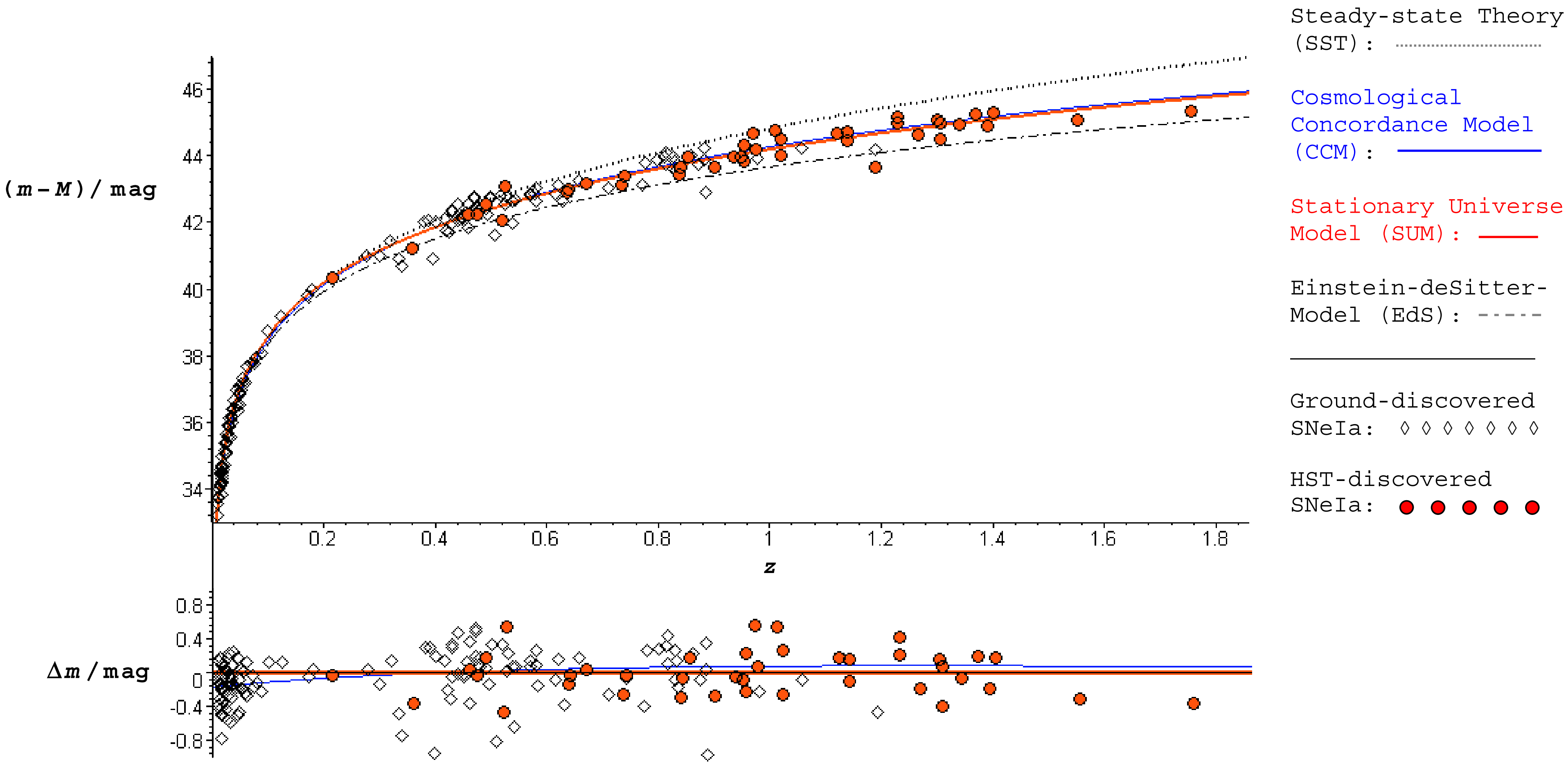


Fig. 8

though the lower panel shows still significant deviations between the CCM- and the SUM-residuals, the picture has changed essentially, because ...

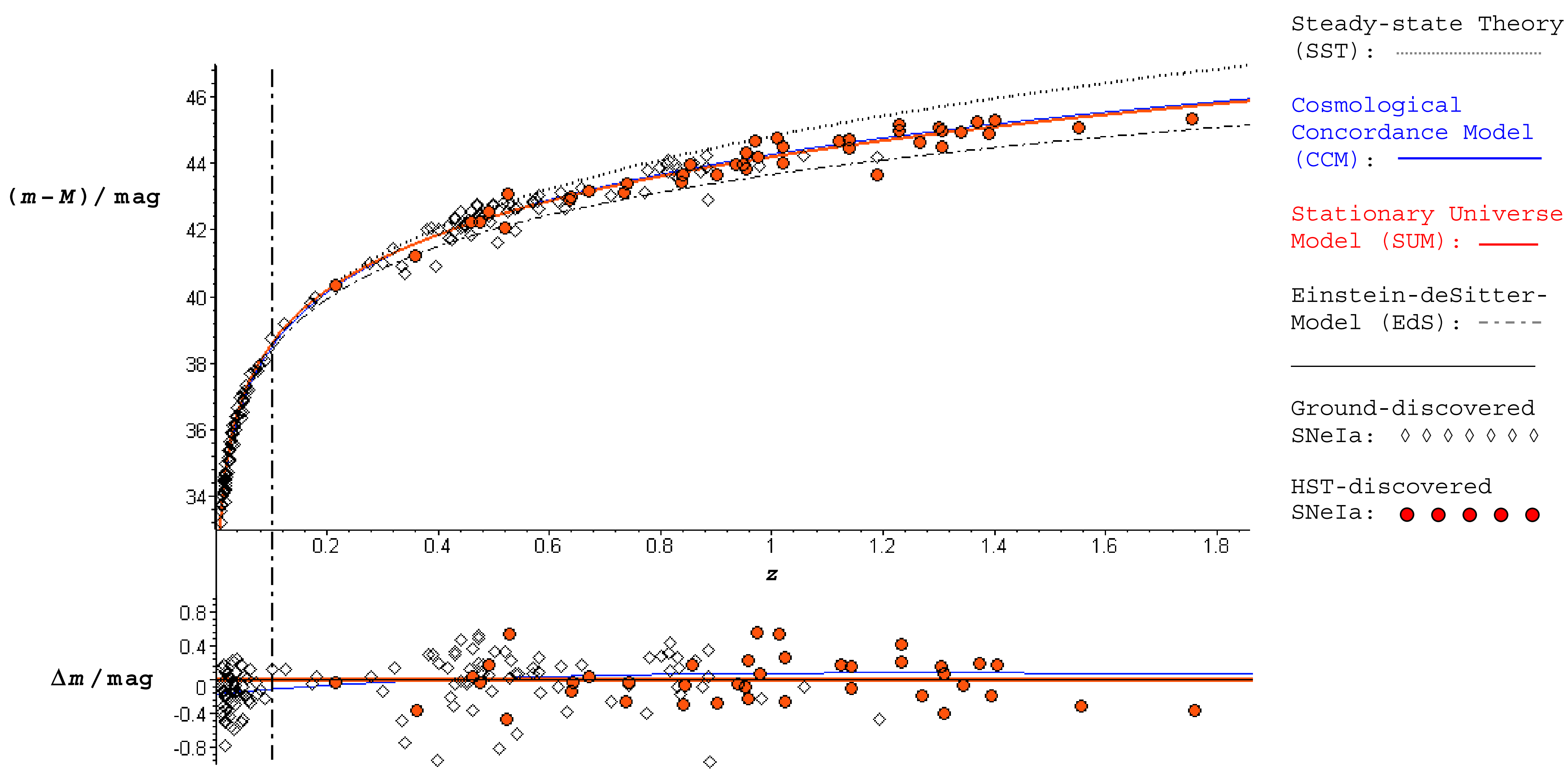


Fig. 9

Though the lower panel shows still significant deviations between the CCM- and the SUM-residuals, the picture has changed essentially, because ...

... now the remaining problem is only a local one concerning the low redshift-range $z \le 0.1$, whereas CCM and SUM both describe the observed *universal* SNe-Ia-range $0.1 < z < 2$ comparably well (the SUM fits even slightly better than the CCM here).

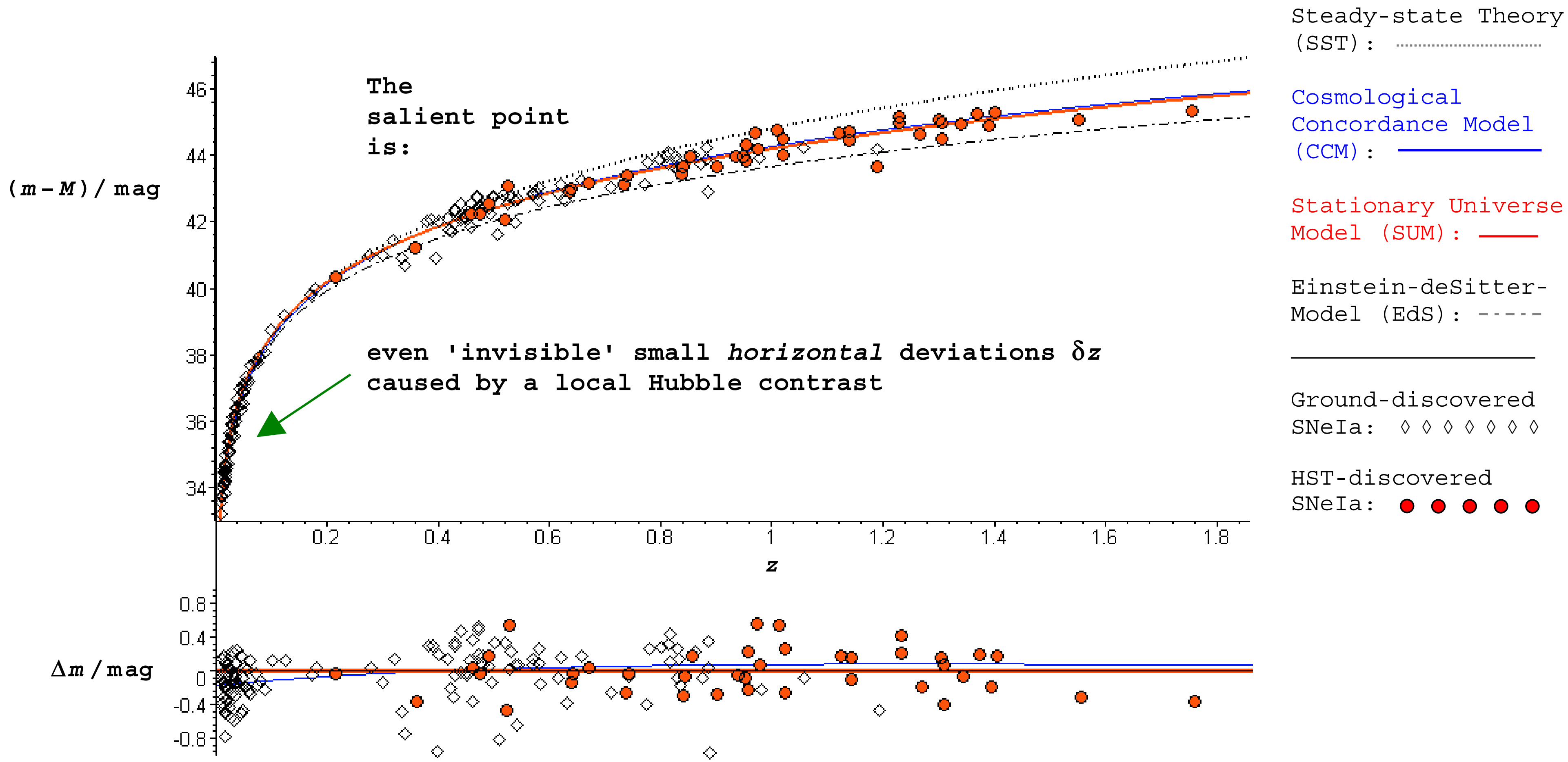


Fig. **10**

Though the lower panel shows still significant deviations between the CCM- and the SUM-residuals, the picture has changed essentially, because ...

... now the remaining problem is only a local one concerning the low redshift-range $z \leq 0.1$, whereas CCM and SUM both describe the observed *universal* SNe-Ia-range $0.1 < z < 2$ comparably well (the SUM fits even slightly better than the CCM here).

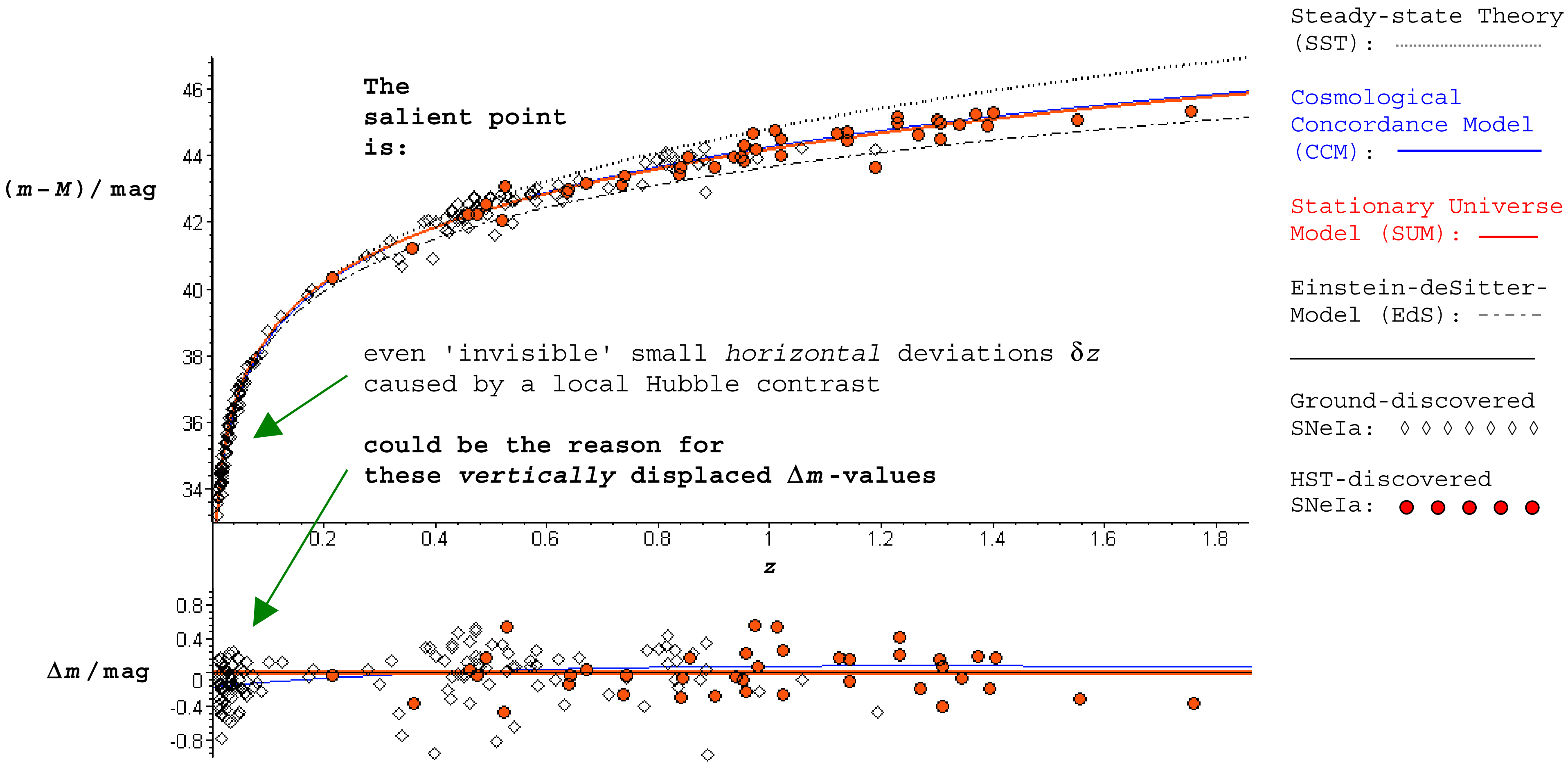


***Fig.* 10**

Though the lower panel shows still significant deviations between the CCM- and the SUM-residuals, the picture has changed essentially, because ...

... now the remaining problem is only a local one concerning the low redshift-range $z \leq 0.1$, whereas CCM and SUM both describe the observed *universal* SNe-Ia-range $0.1 < z < 2$ comparably well (the SUM fits even slightly better than the CCM here).

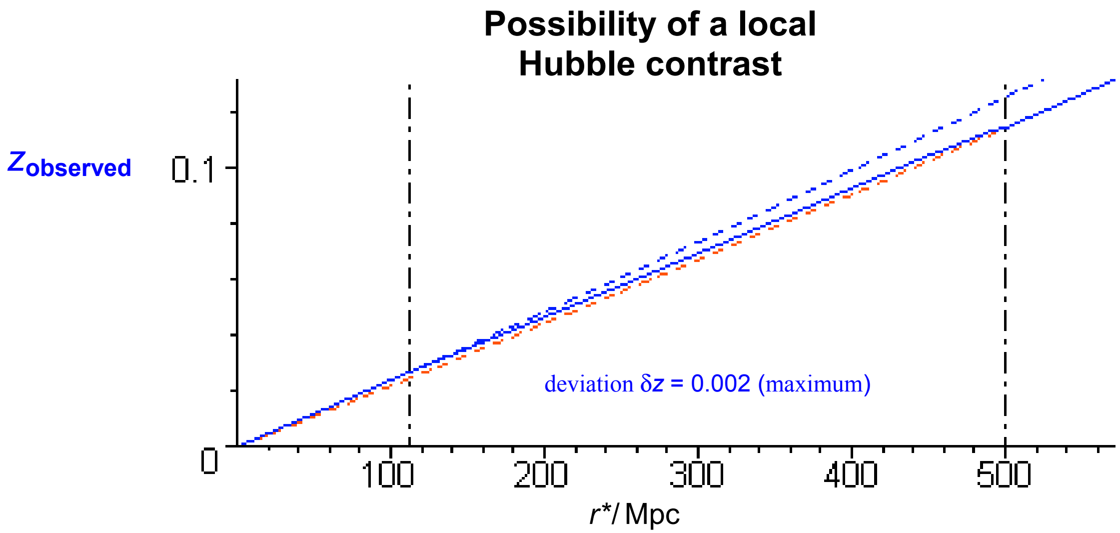


Fig. 11a: **The blue solid line represents the real SNe-Ia observations, the red broken line the SUM. The maximum deviation δz = 0.002 (or 600 km/s/c) corresponds to a Hubble contrast +9%.**

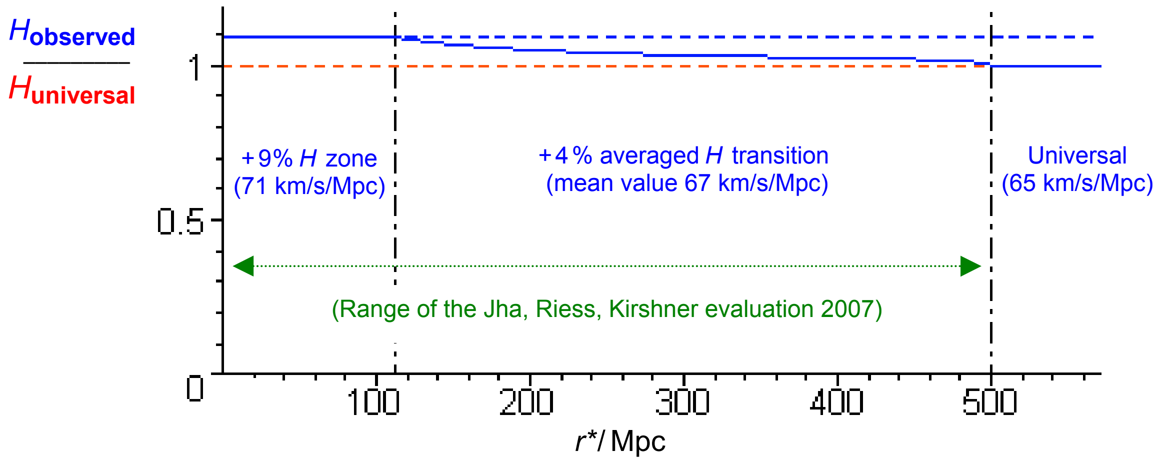


Fig. 11b: **With $H_{\text{universal}}$ = 65 km/s/Mpc e.g. this would mean H_{local} = 71 within $r^* < 113$ Mpc ($z < 0.025$), while the mean value in the transition zone is about 67 km/s/Mpc. The difference 71 − 67 = 4 km/s/Mpc corresponds roughly to what Jha, Riess, Kirshner (2007) reported to be 6.5% ± 1.8%.**

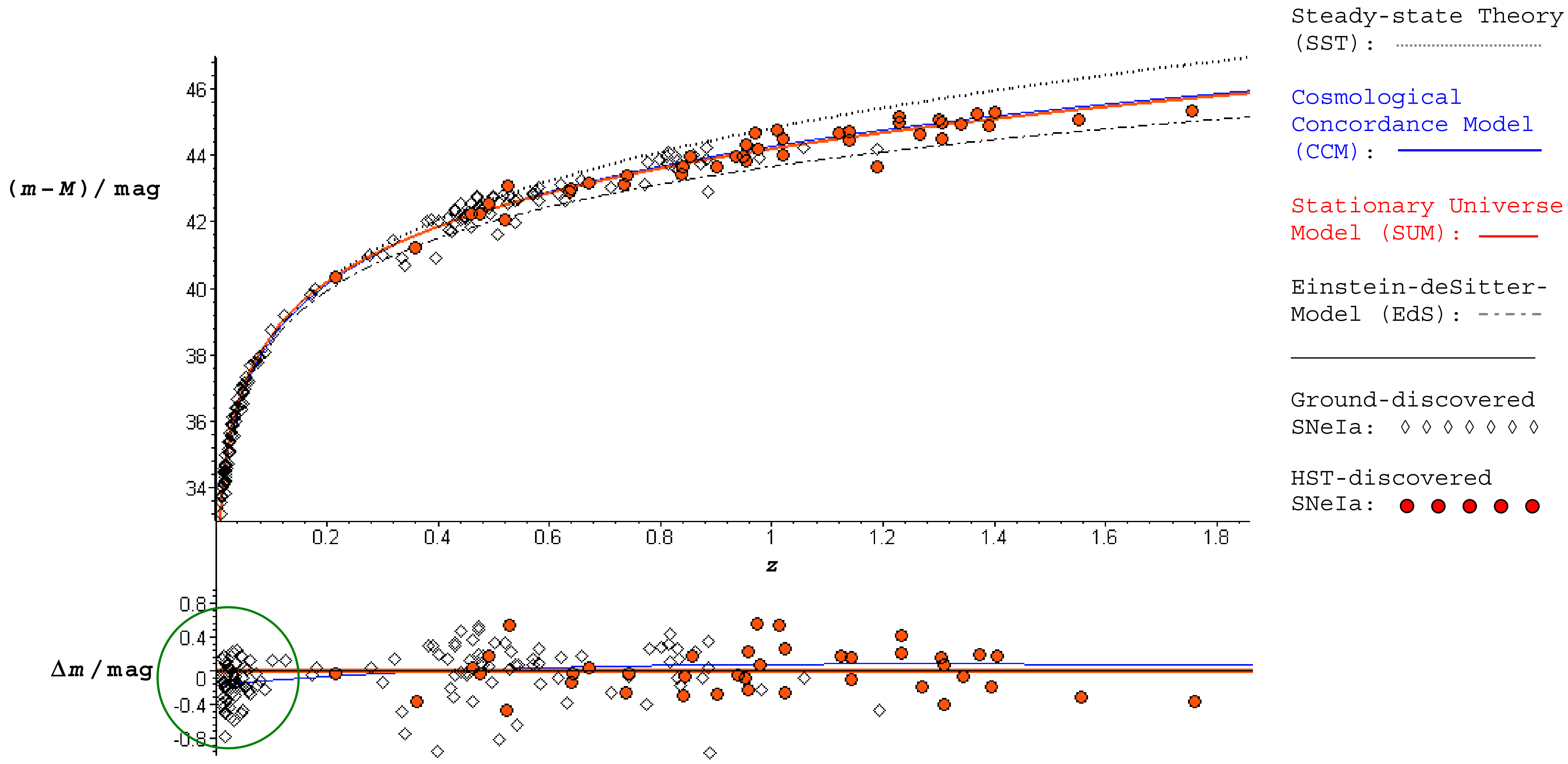


Fig. 12

Coming back to the displacement of the low-redshift residuals Δm
and taking into account a Hubble contrast of 9% according to the previous figures
(though only about 5% can be observed comparing two zones within $z < 0.1$)
you can see jump these low-redshift residuals within the green circle now ...

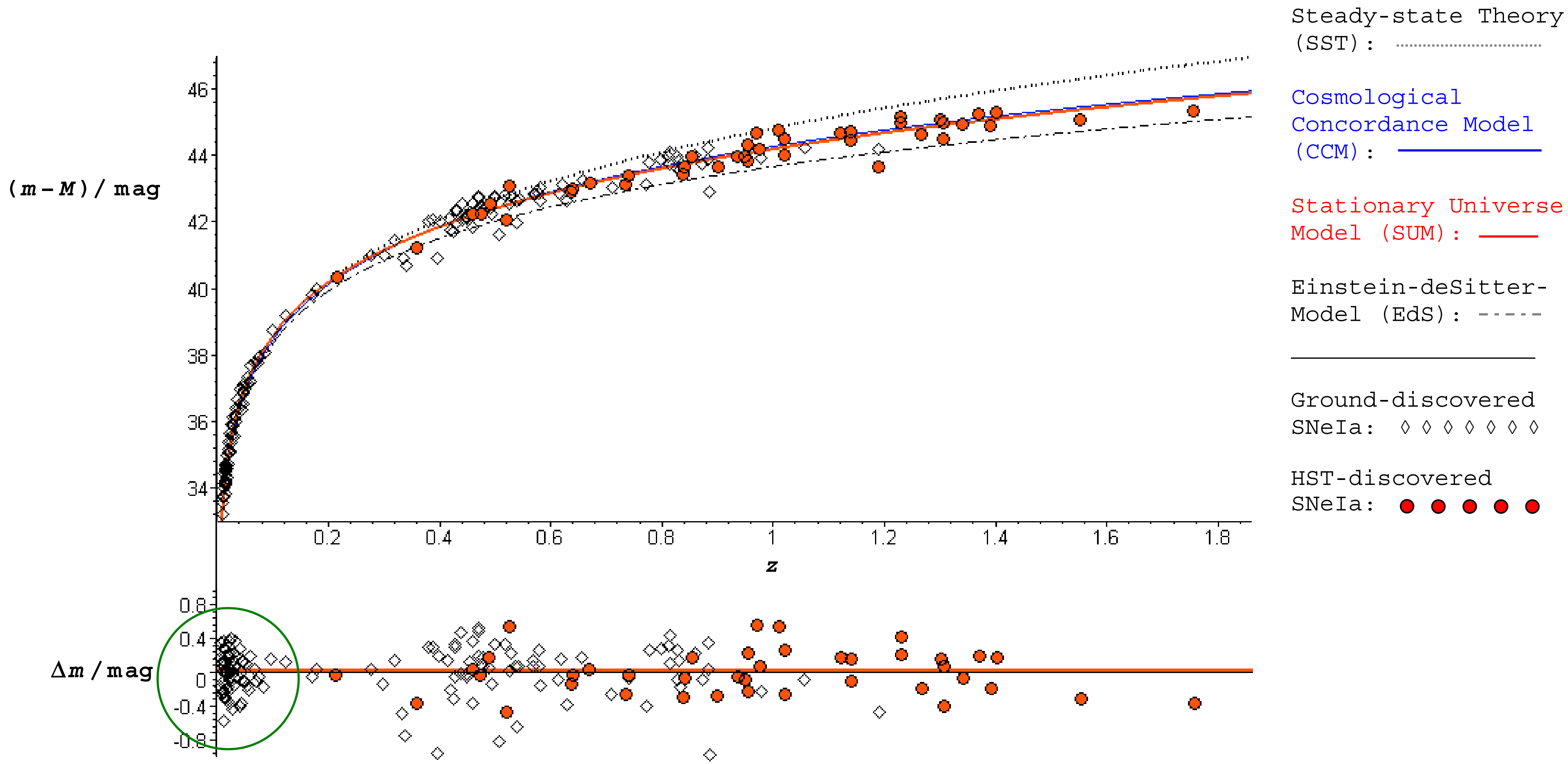


Fig. 13

... to where they belong.
Therefore a δz up to 0.002 only, caused by
a local Hubble contrast of about 9 % within $z_{corrected}$ < 0.025, is sufficient to result in reasonable agreement between the SUM and the SNe-Ia data in the low redshift range z ≤ 0.1, too.
(the χ^2-test comes out slightly better for the SUM than for the CCM now).

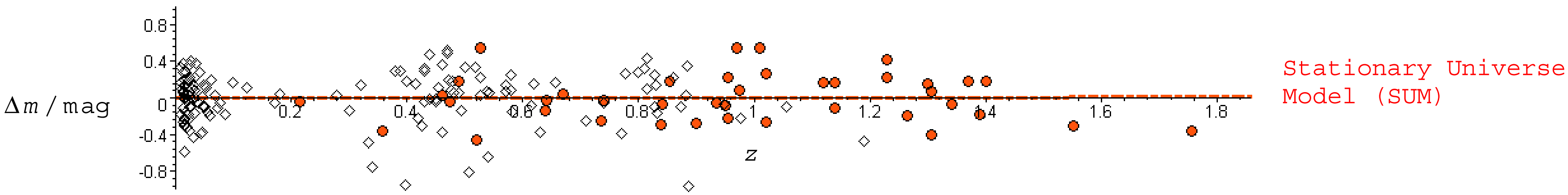


Fig. **14a**

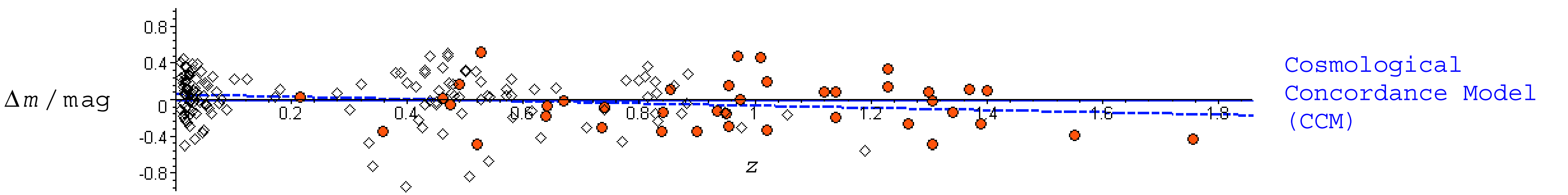


Fig. **14b**

Finally let's take a closer look to assess the quality of the SUM-fits compared to the CCM-fits.
The broken straight lines are determined by the method of least quadratic deviations
over the range shown respectively and they should prove congruent with the z-axis.

At first it may be stated that covering the full data range available so far
the red SUM-fit above is evidently not of less quality than the blue CCM-fit below.

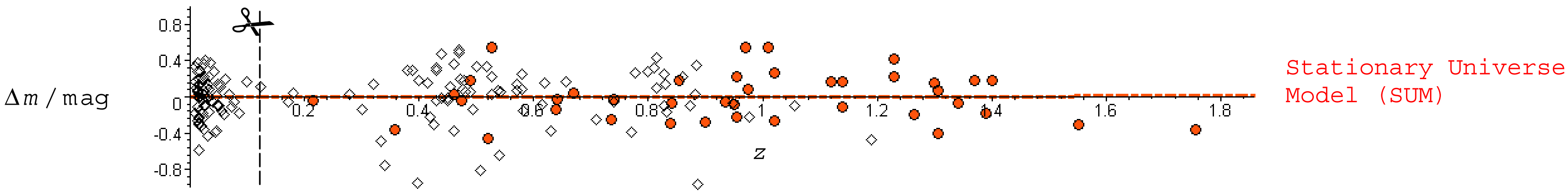


Fig. **15a**

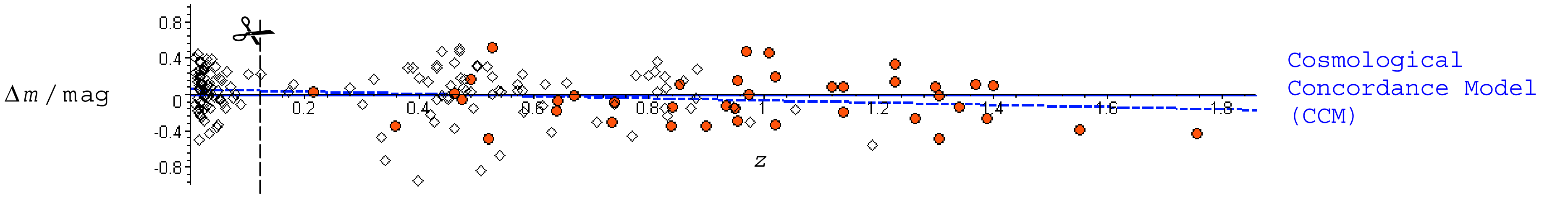


Fig. **15b**

Yet let's take a closer look to assess the quality of the SUM-fits compared to the CCM-fits. The broken straight lines are determined by the method of least quadratic deviations over the range shown here and they should prove congruent with the z-axis respectively.

At first it may be stated that covering the full data range available so far the red SUM-fit above is evidently not of less quality than the blue CCM-fit below.

In the very best case the tendentious z-axis congruence should even apply piecewise.
Therefore, I will divide the full range into the clearly distinguished low redshift range $z < 0.1$ and the high redshift range $0.1 < z < 2$ now.

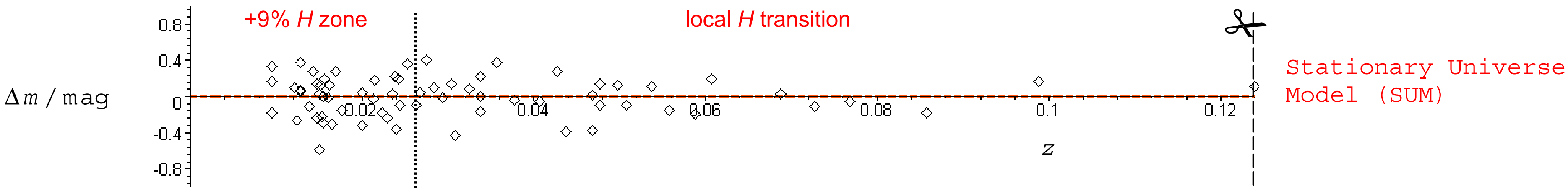


Fig. **16a**

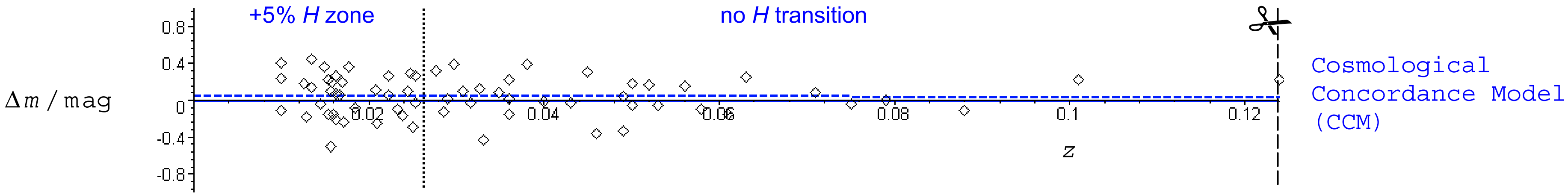


Fig. **16b**

Please keep in mind that the 0-level of the z-axis is bound to the best full-range fit respectively.
Therefore the quality of the SUM-fit is better than the CCM-fit in the low-redshift range, too.

The small displacement of the CCM-line is remarkable,
since it is already corrected here for a local Hubble contrast of 5 %
which value seems the best within the range reported by Jha, Riess, Kirshner
to avoid more significant problems.

On the other hand the SUM-fit is still working with a Hubble contrast of 9 % as shown before.

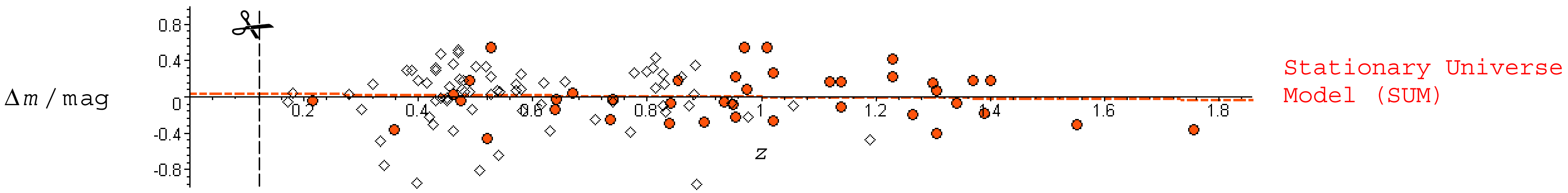


Fig. **17a**

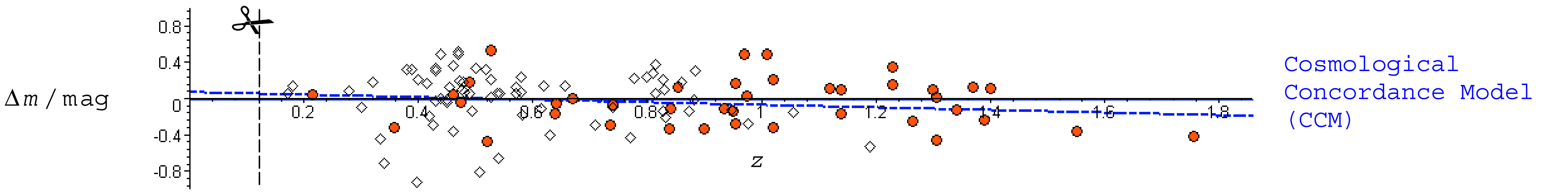


Fig. **17b**

Finally, however, these two figures are of highest importance.
Here, in the high-redshift range $z > 0.1$,
there are compared the pure model predictions without any local corrections.

Please remember that the blue broken line does not represent the prediction but the residuals, i.e. a CCM-deviation from the data.

The original concept and development of the stationary model up to the first conclusion of a local Hubble contrast is documented in this book [6].

If you want to check statements, figures, or equations of this talk, you can find the pdf-sheets at <independent-research.org> including the SNe-Ia data compilation of Riess et al. (2004/07) exactly as used here.

Thank you for your attention.

Literature

[1] RIESS A. G. *et al.*: TYPE Ia SUPERNOVA DISCOVERIES AT $z > 1$ FROM THE HUBBLE SPACE TELESCOPE ..., ApJ **607** (2004) 665–687
[2] RIESS A. G. *et al.*: New Hubble Space Telescope Discoveries of Type Ia Supernovae at $z = 1$ ..., ApJ **659** (2007) 98-121
[3] JHA S., RIESS A. G., KIRSHNER R. P.: Improved Distances to Type Ia Supernovae ..., ApJ **659** (2007) 122-148;
[4] PERLMUTTER S., *et al.*, Bull.Am.Astron.Soc. **29** (1997) 1351; ApJ. **517** (1999) 565-586
[5] RIESS A. G., *et al.*, Astron.J. **116** (1998) 1009-1038
[6] OSTERMANN P.: *Zu Relativitätstheorie, Kosmologie und Quantenmechanik*, digIT Verlag, Munich 2008

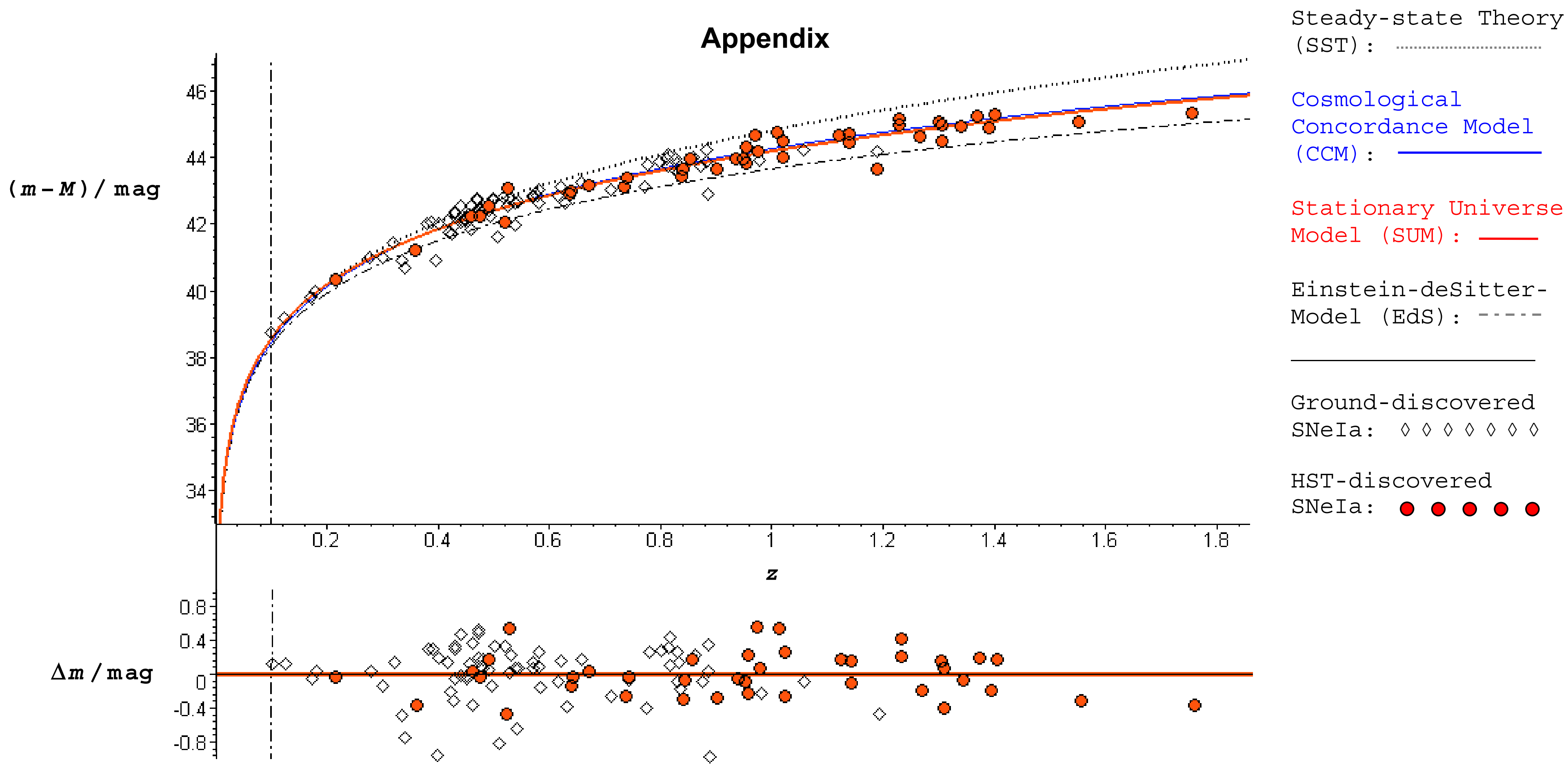


Fig. 18

Concluding my talk I want to point out to the straightforward agreement on large scales once more. What I see is indication from the SNe-Ia data of a stationary background universe described by

$$d\sigma^{*2}_{\mathrm{SUM}} = e^{2Ht^*} d\sigma^{*2}_{\mathrm{SRT}} \ .$$

Though there are reasons that only 'local bangs' might take place as has been explained elsewhere, the SUM presented here is capable of embedding the whole CCM-cosmos, too.

Some more material
for answering questions

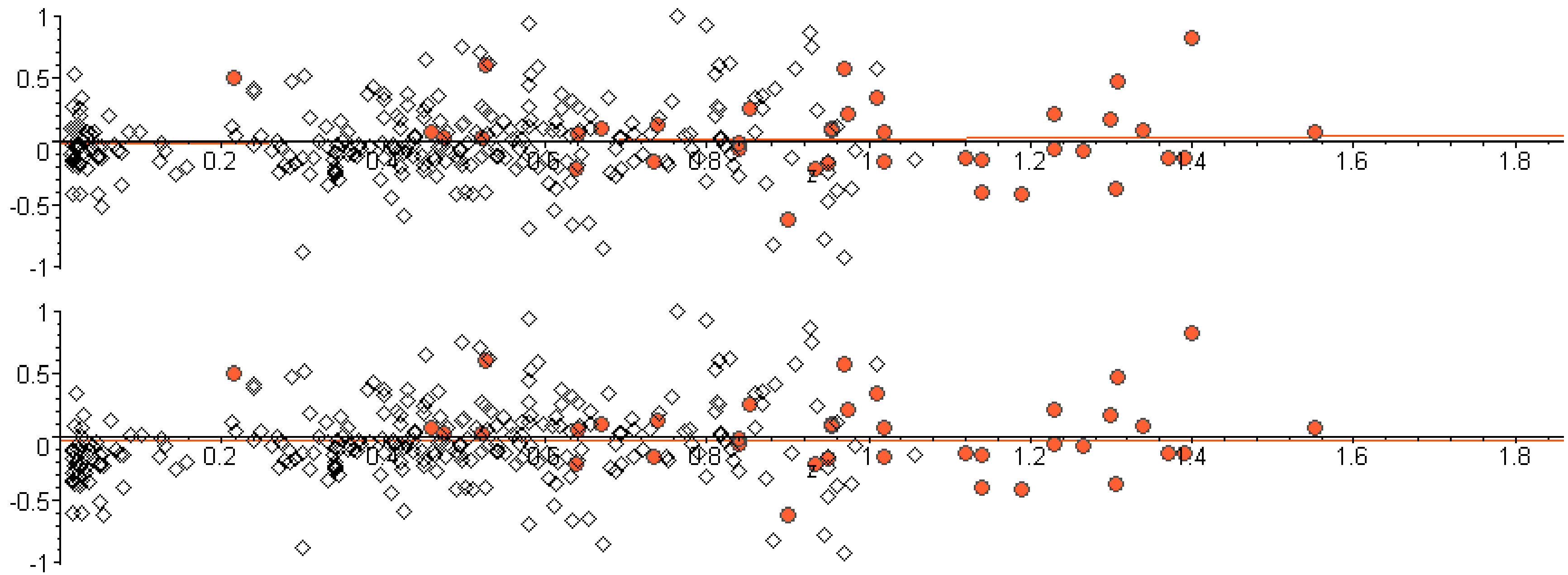
1) I think it's legitimate to claim the Supernovae Ia magnitude-redshift data to represent the most valuable cosmological breakthrough of the last decade because their confrontation with competing theories requires the least input of unproven hypotheses about the universe.

2) It’s simply impossible to work out high precision cosmology without essential priors ...

3) There may be some relationship between a the negative gravitational pressure and a local decrease of entropy since *increasing* entropy of a gas is clearly associated to its *positive* pressure.

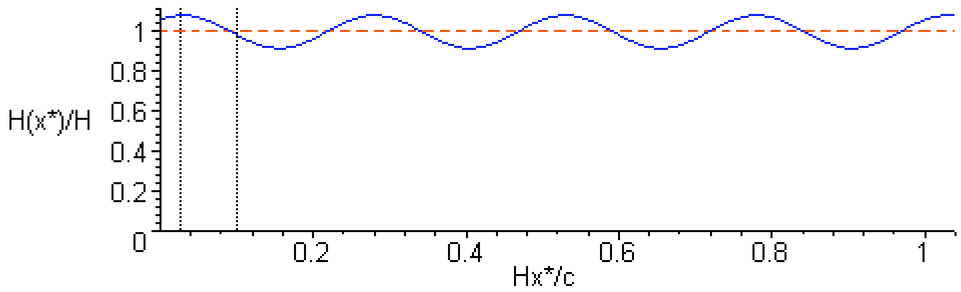
4) At least one thing I know for sure: If you were satisfied with today's Concordance Model, you wouldn't be here in this session.

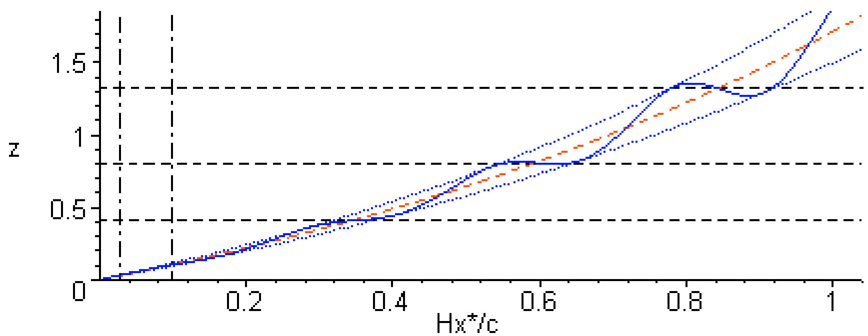
The SUM-residuals of the Kowalski et al. (The Supernova Cosmology Project), Ap.J., 2008 SNe-Ia data



SUM-residuals of the Union Supernova Compilation (reported as world's supernova distance-redshift data) in the upper panel with, in the lower panel without local Hubble contrast.

A simplified model of universal regions with local Hubble contrasts

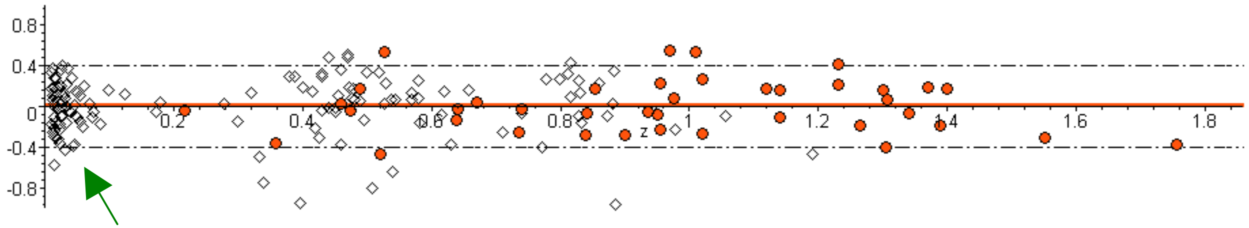




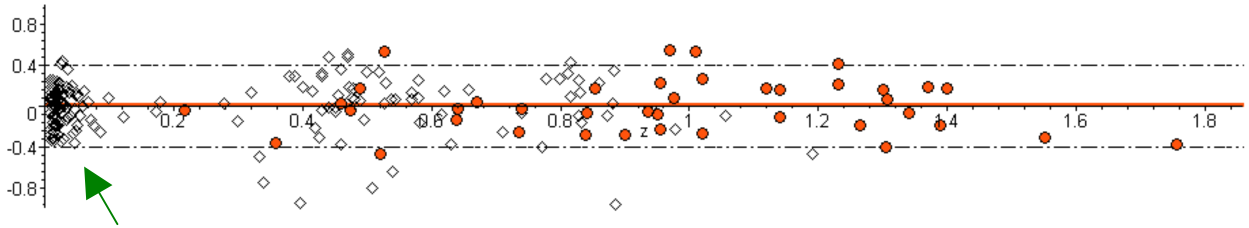
In general a dispersion δz in the redshift caused by various Hubble contrasts is not uniquely reversible without overlapping z values.

If such a model was right, then the prediction is that ...

At a coincidental positioning within a local Hubble contrast - with respect to 'dark' matter it could correspond to a 'local overdensity' instead of a 'local void', too - the local isotropy should be violated measurably. Therefore a ΔH dispersion should be seen looking along one axis only while the solid angle observed is kept small enough.



Dispersion of residuals using the RIESS *et al.* SNe-Ia data



**Dispersion of residuals using the Jha-Riess-Kirshner SNe-Ia data in the range z < 0.124.
The dispersion is reduced only in that range by taking into account the peculiar velocities.
Please note: thus taking into account the peculiar velocities
can reduce the dispersion of the residuals only in the low-redshift range significantly.**

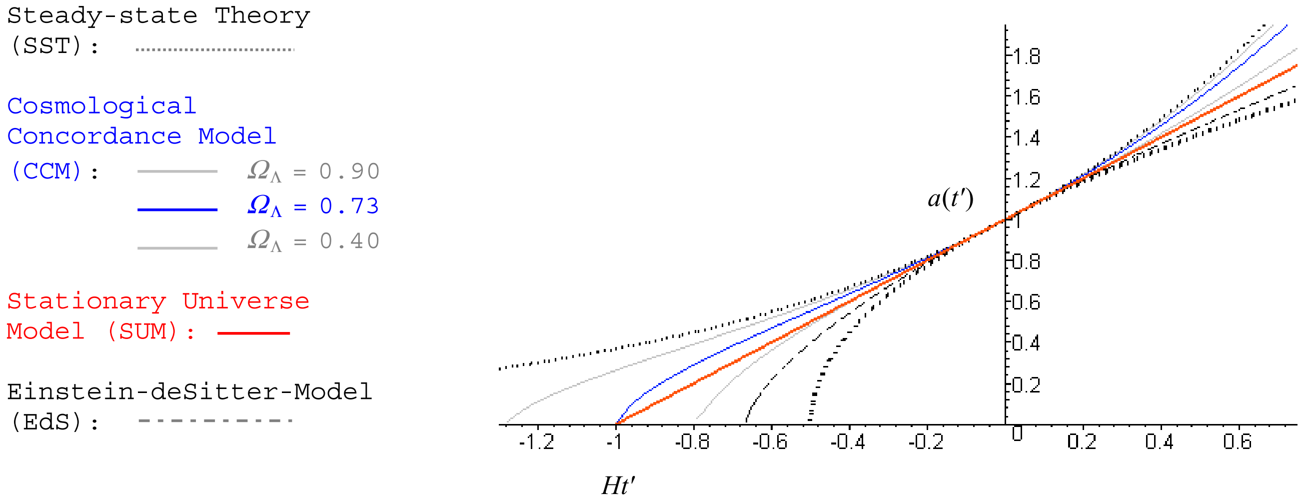
**Therefore possibly the Δm-dispersion of the SNe-Ia will show whether or not
our evolutionary cosmos arose from one big bang and really extends to 3.4 times the Hubble radius ...**

The CCM scale factor in view of the SUM

Neglecting radiation in this context and setting the phenomenological pressure of matter $p_M = 0$, Einstein's equations extended by his cosmological term Λg_{ik}, yield the CCM scale factor

$$a_{\mathrm{CCM}}(t') = \left\{ \left(\frac{1}{\Omega_\Lambda} - 1 \right) \sinh^2 \left[\frac{1}{2} \ln \left(\frac{1-\sqrt{\Omega_\Lambda}}{1+\sqrt{\Omega_\Lambda}} \right) - \frac{3}{2} \sqrt{\Omega_\Lambda}\, Ht' \right] \right\}^{1/3} \qquad (19)$$

where t' is the FLRW coordinate time, $\Omega_\Lambda \equiv \rho_\Lambda / \rho_c$ with ρ_c the critical density and $\rho_M + \rho_\Lambda = \rho_c$ for a spatially Euclidean model.



In contrast to other values (grey solid lines), the best-fit CCM parameter $\Omega_\Lambda \approx 0.73$ (blue line) seems determined by the condition [6] that it should meet the SUM scale factor (red straight line) at its 'boundaries', i.e. at $Ht' = -1$ *and* at $Ht' = 0$.

In view of the standard 'big bang' model an inflation scenario is certainly needed to arrive with e.g. an effectively flat universe, 'superhorizon' scales, and probably all those features one simply would start from, given a stationary universe according to SUM.