



# Untrivial redshifts: a bibliographical catalogue

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## Untrivial redshifts : a bibliographical catalogue

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**Summary.** — We present 780 coded references covering 70 years in the problem of *anomalous* — hereafter *untrivial* (NT) — redshifts (Z).

An arbitrary definition is primarily settled for *trivial* Z and *classical* theories. 17 classes of untrivial redshifts (NTZ) (part 1) and 19 classes of *unclassical* theories (part 2) are investigated in that frame.

Part 3 is the coded catalogue of references. Each paper has a three-digit hexadecimal number in addition to its serial number. That code and the place of the reference in parts 1 or 2 must help the reader to outline a profile for each paper.

Covering stopped at mid-78. An extension to mid-80 has been added for the most observational parts of the study : That extension, when present, is clearly announced in each class by a star (\*).

A more elaborated french text (parts 1 and 2) is available on simple request from the author.

**Key words :** redshifts — untrivial — catalogue.

**Introduction.** — The interpretation of redshifts has been one of the most controverted subjects in Astronomy during the seventies.

Nevertheless the question of *anomalous redshifts* is actually seventy years old.

As the numerous argumentations on this subject are connected with a wide range of scopes, a classified catalogue of the related papers appeared useful.

This study involved the arbitrary choice of a criterion of anomaly or-to avoid a prejudice — of « untriviality » and, as a consequence, the arbitrary definition of a set of theories labelled as *classical*.

We arbitrarily define as *trivial* a redshift which can be easily explained by a combination of the three following effects : Doppler, Schwarzschild, Friedmann.

Those three effects presently are the only sources of clean redshifts (without diffusion and unrelated to frequency) to be widely accepted (save for the Friedman models which are an additional choice).

We define as *classical* :

- the theories which are widely accepted as ascertained by laboratory experiments,
- the three effects above-mentioned,
- the consequences of the three effects : relativistic effects, black holes, Big Bang...

The explicit choice is a frame of work and not the obvious author's own answer to the problem of redshifts : as a frame of work it is not very surprising if it coincides with that of the *center of mass* of the present thoughts in our astronomical community.

Part 1 displays 17 classes of untrivial redshifts (NTZ).

Part 2 is a compilation of 19 classes of *unclassical* theories.

Part 3 is the proper bibliography. Each reference has two numbers : a serial number (called in parts 1 and 2) and a code number (3-digit hexadecimal).

The search and the working out of that catalogue took its place in the years 74 to 78. Covering stopped at mid-78. A lengthening has been performed at mid-80. It acts on the only most observational aspects of the question. This lengthening is, when present, announced by a star (\*) in the class or sub-class of parts 1 and 2.

There is no pretension to exhaustivity in the first part and even less in the second one : unclassical theories often are published in non-astronomical journals which have been explored less systematically.

The frontiers of the subject moreover remain blurred in spite of the arbitrary definition of the frame and the selection or reject of a paper has been sometimes depending on a subjective choice.

Two papers (224, 674) (\*) which include more than 200 references each brought a substantial help to this work chiefly in the range of elder articles.

*Un texte français de 50 pages constituant une présentation plus détaillée du sujet (parties 1 et 2) est disponible, sur simple demande auprès de l'auteur.*

**1. Untrivial redshifts (NTZ) in the frame of classical theories.** — 1.1 NTZ AT THE SUN SURFACE. — First cases (639, 679). Following (226, 679, 506, 637, 638, 655, 343, 459, 682, 652). Classical explanations (143, 347, 676, 661, 654, 288, 713, 714).

1.2 NTZ OF RADIATIONS GRAZING MASSIVE BODIES. — First case (678). Following (643, 659, 677). Classical explanations (144, 648).

(\*) Serial number in the bibliography (part 3).

1.3 NTZ ON STARS. — First case (228). Following (226, 354, 619, 551, 265, 84, 223, 662, 550, 586, 656, 575). Classical explanations (113, 551, 265, 656, 712).

1.4 MORPHOLOGICAL NTZ ON GALAXIES. — First cases (173, 266). Following (184, 185, 554, 276, 277, 569, 716, 22, 278). Classical explanations (266, 283, 182, 215, 554).

1.5 NTZ OF COMPANION GALAXIES. — First cases (17, 18). Following (21, 101, 82, 239, 29). Classical explanations (349, 526, 131).

1.6 NTZ AND THE HUBBLE CONSTANT. — Determinations of  $H_0$  (179, 180, 181, 588, 259, 680, 494, 102, 103, 282, 560, 317, 672, 355, 107, 396, 247, 392, 583, 303, 591, 533, 474, 400). Classical possibilities for  $H_0$  (396, 247, 292, 583, 303). Supercluster (first case) (663). Supercluster (following) (480, 429, 252, 447, 3, 175, 176, 556, 286, 2, 525, 495).

1.7 NTZ AND INHOMOGENEITY OF THE HUBBLE LAW. — First case (174). Following (341, 340, 338, 339). Classical explanations (559, 411, 597).

1.8 NTZ AND ANISOTROPY OF THE HUBBLE LAW. — First cases (55, 484). Hemispheric effect (\*) (281, 289, 342, 487, 248, 485, 486, 482, 183, 186, 629, 483, 11, 768, 757, 758). Cluster effect (301, 302, 280, 300, 402, 403, 405, 323). Isotropy of 3 K (420, 156, 155, 261, 601, 458, 535, 7, 389, 541, 333). Classical explanations (\*) (492, 250, 561, 240, 218, 217, 494, 248, 197, 159, 222, 555, 500, 185, 177, 127, 224, 210, 758). Related questions (250, 231, 98, 316, 408).

1.9 NTZ AND STRUCTURES IN THE HUBBLE DIAGRAM (\*). — First case (567). Bands (567, 568, 569, 571, 573, 574, 576, 580, 581, 572, 575, 577, 578, 570, 579, 755, 756). Classical explanations (347, 716, 691, 596, 603, 605, 527, 528, 604). Related questions (253, 329).

1.10 SPREAD OF NTZ IN GALAXIES AND GROUPS OR CLUSTERS OF GALAXIES. — First cases (267, 636). Following (284, 251, 387). Classical explanations (267, 33, 391, 163).

1.11 NTZ AND ENERGETICS. — First case (269). Strongest case (201). Following (unindexed : quite all non-recent observations of quasars). Variations (234, 235, 669, 565, 566, 287). Classical explanations for energy (89, 417, 158, 361, 40, 331, 394, 507, 450, 490, 263, 264, 517, 519, 587, 631, 262, 585, 292, 56, 57, ... uncompleted). Classical explanations for variations (212, 213, 380, 448, 630, 751, ... uncompleted). Continuity (Sy, N, BL, Lac, Q) (5, 87, 93, 194, 255, 290, 346, 410, 472, 473, 491, 538, 605, 606, 214, 609, 748, 505). Related questions (335, 745, 279, 408).

1.12 NTZ AND Z- HISTOGRAMS (\*). — First cases (119, 441, 120). Following (125, 126, 558, 595, 334, 294, 295, 69, 296, 71, 233, 312). Classical explanations (64, 315, 76, 509, 77, 78, 460, 505, 464, 465, 613, 356, 438, 488, 79, 236, 618, 616, 733, 737).

1.13 NTZ AND SPREAD IN THE HUBBLE DIAGRAM OF QUASARS. — First cases (353, 121). Following (unindexed : trivial spread). Classical explanations (128, 511, 540, 512, 336, 337, 321, 305, 440, 112, 138, 106, 220, 504, 503, 449, 438, 439, 208, 209, 207, 614, 617, 243, 91, 237, 706, 471, 200). Related questions (514, 633, 717, 413, 442, 59, 497, 68, 377, 632).

1.14 NTZ FROM SPATIAL REPARTITION AND APPEARANCE OF QUASARS OR PARENT OBJECTS (\*). — First case (548). Following (644, 684, 685, 20, 297, 298, 279, 381, 462, 594). Classical explanations (612, 618, 452, 285, 249, 242, 268, 728). Classical explanations : Clusters at same  $z$  (50, 245, 41, 478, 409, 470, 246, 127, 383, 544, 545, 80, 457, 725, 724, 705). Classical explanations : Nebulosities (324, 621, 58, 83, 537, 451, 254, 432, 382, 386, 12, 727, 767, 770, 771).

1.15 MULTIPLE NTZ ON THE SAME OBJECT. — First cases (49, 599, 117). Following (48, 646, 665, 42, 668, 45, 46, 153, 647, 152, 100, 461, 615, 38, 1, 516). Classical explanations : intervening galaxies or haloes (322, 10, 118, 660, 51, 137, 94, 257, 435, 162, 645, 625, 623, 622, 698, 161, 502, 124, 607, 428, 524, 39, 13, 468, 670, 149, 434, 431). Classical explanations : ejections (434, 54, 390, 549, 547, 499, 498, 114, 688, 199, 434, 670).

1.16 ASSOCIATIONS WITH DISCREPANT NTZ (\*). — First case (634). Stephan's quintet (707, 694, 9, 520, 24, 60, 61, 62, 291, 709). Following (510, 723, 293, 258, 404, 160, 731, 753, 759, 764, 735). Chains of galaxies (681, 23, 481, 63, 16, 522). Quasar-quasar (683, 686, 141, 26, 436, 693). Quasar-galaxy (642, 602, 116, 130, 33, 309, 25, 32, 27, 36, 328, 30, 543, 31, 397, 327, 14, 628, 397, 47, 110, 309, 95, 53, 730). Connexions (37, 19, 15, 35, 28, 34, 29, 291, 709, 732). Classical explanations (553, 370, 521, 62, 23, 52, 115, 479, 513, 256, 415, 388, 109, 196, 219, 406, 85, 454, 66, 6, 227, 3, 57, 357, 467, 664, 729, 746, 755, 769, 735).

1.17 NTZ THAT LEAD TO SUPERLUMINAL EXPANSIONS (\*). — First case (244). Following (687, 649, 620, 501, 150, 308, 193, 739). Classical explanations (170, 150, 193, 169, 92, 355, 206, 598, 304, 369, 148, 496, 711, 760, 743, 763, 752, 740, 738).

1.18 RELATED STATISTICS (\*). — General (306, 726, 88, 202). Catalogues (636, 399, 178, 530, 534, 695, 307, 749). Corrections (430, 326, 358, 528, 610, 211, 232, 531, 532, 673).

2. **Unclassical theories.** — 2.1 PERTURBED COSMOLOGIES. — Birth (96). Following (204, 205, 419, 715, 371, 372, 373, 557, 489, 165, 97, 72, 73, 75, 74, 690... uncompleted).

2.2 MULTIPLE BIG BANG COSMOLOGIES. — (345, 412, 689).

2.3 COSMOLOGIES WITH A NON-ZERO COSMOLOGICAL CONSTANT. — (463, 441, 120, 437, 466, 704).

2.4 STEADY-STATE COSMOLOGIES. — Critics (104, 105, 453).

2.5 STATIC COSMOLOGIES. — (702, 692, 71, 67).

2.6 VARIATION OF CONSTANTS, LARGE NUMBER HYPOTHESIS AND GAUGE INVARIANCE. — Birth (189, 190). Following (191, 700, 701, 476, 477, 408, 409, 590, 542, 134, 477, 270, 271, 393, 696, 697, 364, 667, 350, 518, 592, 192, 366, 188, 136, 729, 294, 352, 641, 407). Critics (221, 135, 365, 359, 360, 376, 142, 362, 363, 70, 164, 90, 81, 536, 418, 624, 455, 456, 81, 542).

2.7 CHRONOGEOMETRY (\*). — Birth (718). Following (719, 720, 721, 722, 762). Critics (216, 750).

2.8 GENERALIZED GRAVITATIONAL POTENTIAL. — (145, 146, 147).

2.9 COSMOLOGICAL-GRAVITATIONAL REDSHIFTS. — (658, 667, 678, 626, 658, 699).

2.10 FUNDAMENTAL FIELD THEORY. — (318, 319, 320).

2.11 COSMOLOGICAL QUANTUM ELECTRODYNAMICS. — (310, 311, 312, 313, 314).

2.12 PHOTON-PHOTON, PHOTON-BOSON INTERACTIONS (\*). — Birth (166, 167). Following (225, 226, 562, 600, 253, 422, 674, 99, 395, 652, 638, 653, 421, 423, 424, 384, 425, 703, 385, 171, 330, 172, 301, 302, 222, 708, 367, 368, 475, 674, 422, 742). Critics (375, 378, 8, 627, 600, 608, 151, 132, 584, 446, 157, 143, 348, 542, 744, 761, 734).

2.13 STATES OF MATTER. — (574, 575, 576, 581, 578, 17).

2.14 ENERGETICS AND EQUIVALENCE PRINCIPLE. — (388).

2.15 COSMOLOGICAL DÖPPLER REDSHIFTS. — (344, 195).

2.16 LOCAL THEORY OF QUASARS (\*). — Galactic ejections (563, 564). Non-existence of quasars redshifts (593, 594, 595). Blueshifts of quasars (756).

2.17 COSMOLOGICAL RAMAN EFFECT. — (229).

2.18 STARK EFFECT ON QUASARS. — (589).

2.19 SPACE-TIME QUANTIFICATION. — (351).

3. **Catalogue.** — References are alphabetically classified in four sequences : 1 to 636, 637 to 687, 688 to 729 and 729 to 772.

Two numbers go in front of each reference :

- the serial number by which the paper is called in the text ;
- the three-digit hexa-decimal code number which is defined as follows.

*First digit : concerned subject*

- 1 : Inhomogeneity of the Hubble Law
- 2 : Anisotropy of the Hubble Law
- 3 : Multiple redshifts
- 4 : Redshifts on or by the Sun
- 5 : Uncoded
- 7 : 3 K radiation
- 8 : General problem of redshifts
- 9 : Superluminal expansions
- A : Associations
- B : ( $z$ ,  $m$ ) relation
- C : Companion galaxies
- D : Redshifts of stars
- E : Energetics, evolution and position of objects
- F : Morphological redshifts
- O : No direct concern with NTZ

*Second digit : Matter*

- 1 : Statistical study on quasars
- 2 : Statistical study on non-quasars objects
- 3 : Methodology of redshifts measurements
- 4 : Methodology of magnitudes measurements
- 5 : Methodology of redshifts and magnitudes measurements
- 6 : New experimental results except for magnitudes and redshifts
- 7 : Uncoded
- 8 : Theory ; Physical process
- 9 : Review paper ; catalogue
- A : New experimental results for redshifts of quasars
- B : New experimental results for magnitudes of quasars
- C : New experimental results for redshifts and magnitudes of quasars
- D : New experimental results of redshifts of non-quasar objects
- E : New experimental results of magnitudes of non-quasar objects
- F : New experimental results of redshifts and magnitudes of non-quasar objects

*Third digit : Favoured interpretation*

- 1 : Uncoded
- 2 : Several competitive interpretations
- 3 : Continuity between quasars and common objects
- 4 : High velocity of the Sun
- 5 : Value of  $H_0$
- 6 : Relativistic objects
- 7 : Superclusters or inhomogeneities  $\sim 100$  Mpc
- 8 : Intrinsic redshift of undefined origin
- 9 : Gravitational redshift
- A : Classical explanation (Friedmann, Classical Physics, black holes...)
- B : Classical explanation through bias
- C : Variation of constants, LNH
- D : Perturbed cosmologies
- E : Unsignificativeness of used statistics
- F : Photon-photon, photon-boson interactions
- O : No interpretation of NTZ

A star (\*) which follows the code number points out that the paper encloses related references outside the catalogue.

Figure 1 shows the yearly distribution of the referenced papers.

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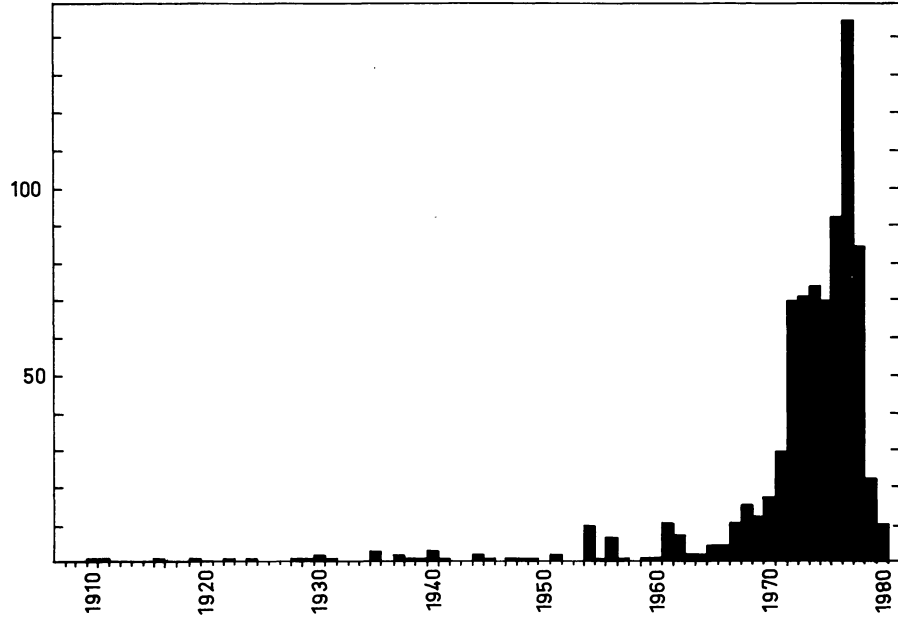


FIGURE 1. — Yearly distribution of the 780 referenced publications. The decrease after 1977, though likely real, is greatly enlarged by the partial character of the lengthening 78-80.