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# A DISCUSSION ON THE AGE OF THE UNIVERSE

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## Abstract

The present paper provides some discussion and result about the age of the Universe.

#### 1. Introduction

This discussion is on the local tests in General Relativity which are not best with the uncertainties associated with measurements of object very far away in universe. The Friedman cosmology (or model) provides a formula for the age of the universe. In the

Einstein de Sitter Model if we identify  $H_{\circ}$  with

 $H_0$  with the present Hubble constant

(where at any given epoch, s represents the scale factor converting co-ordinate intervals to proper intervals and the dot denotes differentiation w.r.t. t) then the present epoch is given by

 $t = t_{\overline{0}}^{2} H_{3}^{-1}$  (1)

Assuming that the universe cane into existence at t = 0, we may treat  $t_0$  as the age of the universe. Thus according to the present estimates and equ. (1) this age is  $10^{10}$  years.

Here q(t) is the acceleration parameter given by

$$H^{2}(t) | s| H(t) \qquad q(t) = -\frac{1}{\bigcup} (\dot{s}) = -\frac{s}{s}$$

and 
$$q(t_0) = q_0$$
,  $H(t_0) = H_0$ 

Knowing  $q_0$  and  $H_0$  we can calculate the age of the universe and compare it with ages of object in our nearly locality.

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#### 2. Discussion and result

The age of galaxy is estimated (1) at  $1 - 1.5 \times 10^{10}$ , on the basis of stellar evolution and nucleon synthesis as well as on the basis of radioactive decay. Taking the value of H<sub>0</sub> around  $1.8 \times 10^{10}$  years, in the Einstein-de Sitter Model, the age of the universe  $1.2 \times 10^{10}$ years. Assuming that the galaxy is only  $10^{10}$  years old, there is no discrepancy. However, the higher limit of  $1.5 \times 10^{10}$  years and the fact that more evolved and hence older galaxies than ours are seen may rule out this model unless H<sub>0</sub> is revised downwards. The model with  $q_0=1$  is even more constratained in this way. The highest theoretical age is H<sup>-1</sup><sub>0</sub> for  $q_0=0$  (the empty universe). The situation ,of course, gets worse if H<sub>0</sub> in revised upwards, as suggested for example by de Vou-Couleurs (2).

## 3. Conclusion

The appearance of very old galaxies is not such an embarrassment to the steady state theory which has the universe infinitely old. However, the theorypredicts a preponderance of young galaxies and the average age of only  $(3H)_0^{-1} = 6 \times 10^9$  years, where are these young galaxies? Clearly it is necessary to understand galactic evolution before answering this question. For instance, young galaxies may not be easily visible. Or, galaxies may Hoyle (3). In that case we may be living in a cluster where galaxies of age  $1.5 \times 10^{10}$  years are predominant.

#### **References:**

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