

STATISTICS OF IMAGES OF GALAXIES WITH PARTICULAR REFERENCE TO CLUSTERING

JERZY NEYMAN AND ELIZABETH L. SCOTT

STATISTICAL LABORATORY

AND

C. D. SHANE

LICK OBSERVATORY

UNIVERSITY OF CALIFORNIA

CONTENTS

	PAGE
General Introduction	75
I. OBSERVATIONAL STUDIES OF THE DISTRIBUTION OF IMAGES OF GALAXIES	
1. Introductory remarks	77
2. Existing surveys of galaxies	77
3. Suggested program of surveys	79
II. PROBABILISTIC STUDIES OF THE DISTRIBUTION OF IMAGES OF GALAXIES	
4. General remarks	80
5. Postulates underlying the stochastic model of clustering	81
6. Generalization to a possibly expanding universe	83
7. Postulate regarding the "visibility" of a galaxy on a photographic plate	84
8. Basic formulas of the theory of simple clustering of galaxies	86
9. Some numerical results	88
10. Expected number of images of galaxies per square degree	92
11. Generalization of the original model: model of multiple clustering	96
12. Probability distribution of certain characteristics of images of clusters	100
13. Problem of interlocking of clusters	101
14. Model of fluctuating density of galaxies	104
15. Test for expansion of clusters of galaxies	106
16. Concluding section: some important outstanding problems	106

GENERAL INTRODUCTION

The paper summarizes the results obtained by the authors in a cooperative study extending over several years and outlines a program of future work. Theoretical results which are not yet published include (i) extension of the model of simple clustering of galaxies, originally developed for a static universe, to cover the possibility that the universe is expanding (sections 6 and 8), (ii) a model of multiple clustering (section 11), and (iii) formulas relating to the distributions of certain characteristics of images of clusters on the photographic plate (section 12). New empirical results, given in section 9, indicate that, probably, the model of simple clustering of galaxies in a stationary universe does not correspond to reality.

While the title of this paper is "Statistics of Images of Galaxies" and while this

Prepared with the partial support of the Office of Naval Research.