barred galaxies, and from this we investigate the global luminosity structure of bars. The decomposition of luminosity profiles into three distinct components, bulge, disk, and bar, yields the luminosity laws along and perpendicular to bar axis; an exponential law for bar major axis and a Gaussian law for bar minor axis. We analyze the distribution of bar luminosity and the gradient of bar profile in connection with morphological types, and also examine scale lengths and scale brightness of bulge and disk. The relationships of the bar strengths with the frequency of occurrence of secondary components such as lenses and rings and with spiral arm patterns are discussed in view of the secular evolution of barred galaxies suggested by Kormendy.

Stellar Populations in External Galaxies. II. Constrained Synthesis Models Including Ultraviolet Flux Distributions

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Astrophysically plausible population models of several external galaxies are obtained from their integrated spectra using "Linear Programming" algorithm. The observations of Astronomical Netherlands Satellite(ANS), International Ultraviolet Explorer(IUE), and Orbiting Astronomical Observatory[2] (OAO2) are applied to the synthesis problem with optical spectra.

The origin of strong UV light not expected from the generally accepted metal-rich old population models is searched for. There are several candidates such like O-B main sequence, horizontal branch, blue stragglers, nuclei of planetary nebula, and so forth. But neither the observations nor the theories make us determine what group is the real contributor. Characteristics of the models from including each one of above groups are discussed. The incompleteness problem of stellar library used for the synthesis, suggested by Whang and Lee (1986, Parer I) is not solved clearly yet, but its effect to the models presented in this paper is carefully examined.

Surface Photometry of Barred Galaxies: Morphology and Geometrical Parameters

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We investigate the morphology and geometric properties of 43 barred galaxies from a detailed surface photometry which was made with the Kiso V-band plates. Isophote maps and direct photographs together with density tracings on the Image Display are used for the investigation of various geometric properties (position angles, diametes, axis ratios, etc.) of the distinct components. Among others, the present study shows the followings:

1) Sufficient fraction of barred galaxies have triaxial bulges which might be the result of infall of disk gases into the nuclei of the galaxies through the bars.

2) The axial ratios of bars are 0.5 ± 0.1 and there is a mild trend that early type galaxies have larger axial ratios than late type galaxies.

3) The position angles of bars have no correlation with those of disks but they are correlated with

those of lenses. The above results may be intepreted by the hypothesis of secular evolution in the barred galaxies.

Collimation Mechanism of Optical Jet Inside the Bipolar Molecular Outflows: Evaporation Effect

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An evaporation disk model is proposed to figure out shapes of molecular disks with density distributions of $\sigma_d \propto r^{-n} (n > 1.8)$ using the energy and pressure equilibrium conditions as well as to explain to collimation mechanism of optical and radio jets with an openning angle of about $10°$ inside bipolar molecular outflows.

Numerical hydrodynamic calculation of the jet inside shows that the jet velocity increases with a dependence on $Z^{1.5}$ and the Mach number of the jet converges to $\sqrt{3}$. Mechanical energy of the jet heats the jet material, increasing the jet temperature with a distance. Calculated Hα flux in shock condition and radio continuum intensity at 5GHz are surely comparable to the observed ones. These results strongly support the evaporation disk model in collimating jet.

The Distribution of Dust Inside the Orion Nebula

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The spatial distribution of the volumetric scattering cross section of dust, $n(r)\sigma_{sca}(r;\ \lambda)$, and of the dust-to-gas ratio $n(r)_{sca}(r;\ \lambda)/n(r)_{gas}$ in the Orion nebula are derived from the observations of scattered continuum in the UV and visual wavelength region. Single scattering with the hemispherical geometry is assumed. The resulting distribution of dust-to-gas ratio shows that dust particles are depleted near the central star, thus there must be a cavity that contains little dust. The distribution of dust and their scattering characteristics will be briefly discussed.

The Predicted [H_2] Ro-Vibrational and [OI] 63.19μm Line Intensities From Interacting Clouds in Galaxies

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The purpose of this work is to determine the predicted intensities of atomic fine structure and H_2 emission from an ensemble of unresolved interacting clouds and then apply this to normal and interacting galaxies. Calculation of shock intensities for cloud collisions was performed for the case of no magnetic field or collisions along the magnetic field. In this calculation, I considered several cooling mechanisms and chemistry.

Calculation of the infrared [H_2] and [OI] 63.19μm line intensities from an individual cloud as a