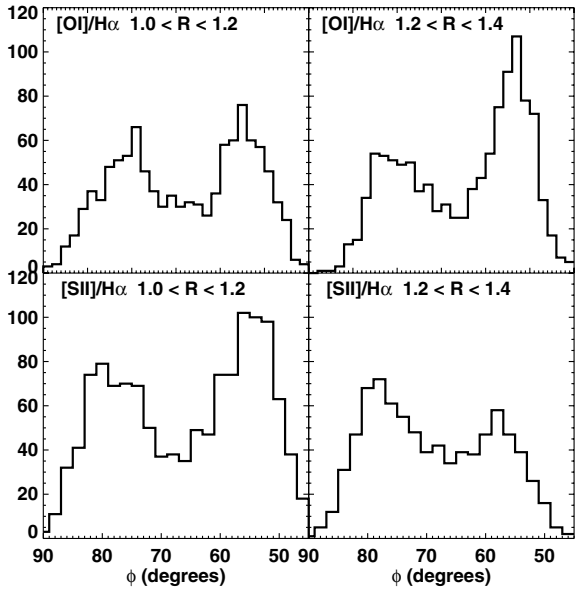


**Figure 3.** Histograms of the Seyfert and LINER sequences between 1.0 and 1.2 dex (left-hand panel) and 1.2 and 1.4 dex (right-hand panel) for the [O I]/H$\alpha$ (top panel) and [S II]/H$\alpha$ (bottom panel) diagnostic diagrams. The distribution is clearly bimodal. The LINER sequence is the right-hand peak and the Seyfert sequence is the left-hand peak.

and [O I]/H$\alpha$ diagrams:

$$\log([\mathrm{O\,III}]/\mathrm{H}\beta) < 0.61/[\log([\mathrm{N\,II}]/\mathrm{H}\alpha) - 0.05] + 1.3, \quad (1)$$

$$\log([\mathrm{O\,III}]/\mathrm{H}\beta) < 0.72/[\log([\mathrm{S\,II}]/\mathrm{H}\alpha) - 0.32] + 1.30, \quad (2)$$

and

$$\log([\mathrm{O\,III}]/\mathrm{H}\beta) < 0.73/[\log([\mathrm{O\,I}]/\mathrm{H}\alpha) + 0.59] + 1.33. \quad (3)$$

(ii) *Composite galaxies* lie between the Ka03 and Ke01 classification lines on the [N II]/H$\alpha$ versus [O III]/H$\beta$ diagram:

$$0.61/[\log([\mathrm{N\,II}]/\mathrm{H}\alpha) - 0.05] + 1.3 < \log([\mathrm{O\,III}]/\mathrm{H}\beta), \quad (4)$$

$$0.61/[\log([\mathrm{N\,II}]/\mathrm{H}\alpha) - 0.47] + 1.19 > \log([\mathrm{O\,III}]/\mathrm{H}\beta). \quad (5)$$

(iii) *Seyfert galaxies* lie above the Ke01 classification line on the [N II]/H$\alpha$, [S II]/H$\alpha$, and [O I]/H$\alpha$ diagnostic diagrams and above the Seyfert–LINER line on the [S II]/H$\alpha$ and [O I]/H$\alpha$ diagrams, that is,

$$0.61/[\log([\mathrm{N\,II}]/\mathrm{H}\alpha) - 0.47] + 1.19 < \log([\mathrm{O\,III}]/\mathrm{H}\beta), \quad (6)$$

$$0.72/[\log([\mathrm{S\,II}]/\mathrm{H}\alpha) - 0.32] + 1.30 < \log([\mathrm{O\,III}]/\mathrm{H}\beta), \quad (7)$$

$$0.73/[\log([\mathrm{O\,I}]/\mathrm{H}\alpha) + 0.59] + 1.33 < \log([\mathrm{O\,III}]/\mathrm{H}\beta) \quad (8)$$

or

$$[\log([\mathrm{O\,I}]/\mathrm{H}\alpha) > -0.59]$$

and

$$1.89\log([\mathrm{S\,II}]/\mathrm{H}\alpha) + 0.76 < \log([\mathrm{O\,III}]/\mathrm{H}\beta), \quad (9)$$

$$1.18\log([\mathrm{O\,I}]/\mathrm{H}\alpha) + 1.30 < \log([\mathrm{O\,III}]/\mathrm{H}\beta). \quad (10)$$

(iv) *LINERs* lie above the Ke01 classification line on the [N II]/H$\alpha$, [S II]/H$\alpha$, and [O I]/H$\alpha$ diagnostic diagrams and below the Seyfert–LINER line on the [S II]/H$\alpha$ and [O I]/H$\alpha$ diagrams, that is,

$$0.61/[\log([\mathrm{N\,II}]/\mathrm{H}\alpha) - 0.47] + 1.19 < \log([\mathrm{O\,III}]/\mathrm{H}\beta) \quad (11)$$

$$0.72/[\log([\mathrm{S\,II}]/\mathrm{H}\alpha) - 0.32] + 1.30 < \log([\mathrm{O\,III}]/\mathrm{H}\beta), \quad (12)$$

$$\log([\mathrm{O\,III}]/\mathrm{H}\beta) < 1.89\log([\mathrm{S\,II}]/\mathrm{H}\alpha) + 0.76, \quad (13)$$

$$0.73/[\log([\mathrm{O\,I}]/\mathrm{H}\alpha) + 0.59] + 1.33 < \log([\mathrm{O\,III}]/\mathrm{H}\beta) \quad (14)$$

or

$$[\log([\mathrm{O\,I}]/\mathrm{H}\alpha) > -0.59]$$

$$\log([\mathrm{O\,III}]/\mathrm{H}\beta) < 1.18\log([\mathrm{O\,I}]/\mathrm{H}\alpha) + 1.30. \quad (15)$$

(v) *Ambiguous galaxies* are those that are classified as one type of object in one or two diagrams and classified as another type of object in the remaining diagram(s). In our scheme, ambiguous galaxies fall into one of two categories: (1) galaxies that lie in the Seyfert region in either the [S II]/H$\alpha$ or the [O I]/H$\alpha$ diagram and in the LINER region in the remaining ([O I]/H$\alpha$ or [S II]/H$\alpha$) diagram, or (2) galaxies that lie in the composite region (below the Ke01 line) in the [N II]/H$\alpha$ diagram but that lie above the Ke01 line in either the [S II]/H$\alpha$ or the [O I]/H$\alpha$ diagram.

According to this scheme, our 85 224-galaxy sample contains 63 893 (75 per cent) star-forming galaxies, 2411 (3 per cent) Seyferts, 6005 (7 per cent) LINERs, and 5870 (7 per cent) composites. The remaining galaxies are ambiguous galaxies (7045; 8 per cent).

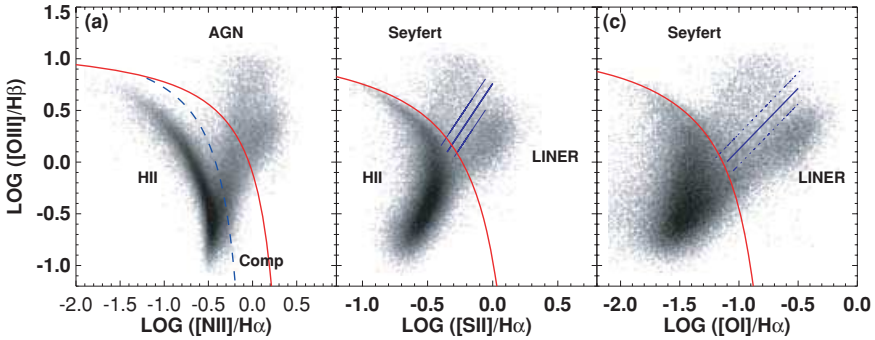


**Figure 4.** The three BPT diagrams showing our new scheme for classifying galaxies using emission-line ratios. The Ke01 extreme starburst classification line (red solid line), the Ka03 pure star formation line (blue dashed line), and our new Seyfert–LINER line (blue solid line) are used to separate galaxies into H II-region-like, Seyferts, LINERs, and composite H II–AGN types.