

Table 6. Photon energies ( $E_p$ 's) in the hydrogen spectrum used to construct Table 7 and Fig. 12.

Bolded  $E_p$ 's are in the range 617.3-2239.5  $\text{cm}^{-1}$ . These  $E_p$ 's are for the points plotted in Fig. 12.

| $n_i$ | $n_f = 4$       | [ $i$ ] | $n_f = 5$       | [ $i$ ] | $n_f = 6$       | [ $i$ ]  | $n_f = 7$     | [ $i$ ]   | $n_f = 8$     |
|-------|-----------------|---------|-----------------|---------|-----------------|----------|---------------|-----------|---------------|
| 5     | (High $E_p$ 's) |         |                 |         |                 |          |               |           |               |
| 6     | ↓               | [15]    | <b>1341.2</b>   |         |                 |          |               |           |               |
| 7     |                 | [2]     | <b>2149.9</b>   | [18]    | <b>808.7</b>    |          |               |           |               |
| 8     |                 |         | (High $E_p$ 's) | [15]    | <b>1333.6</b>   |          | (Low $E_p$ )  |           |               |
| 9     |                 |         | ↓               | [11]    | <b>1693.5</b>   | [17]     | <b>884.8</b>  |           | (Low $E_p$ )  |
| 10    |                 |         |                 | [4]     | <b>1950.9</b>   | [16]     | <b>1142.2</b> | [19]      | <b>617.3</b>  |
| 11    |                 |         |                 | [2]     | <b>2141.3</b>   | [15]     | <b>1332.6</b> | [18]      | <b>807.7</b>  |
| 12    |                 |         |                 |         | (High $E_p$ 's) | [14]     | <b>1477.5</b> | E ring    | 952.6         |
| 13    |                 |         |                 |         | ↓               | [13]     | <b>1590.2</b> | E ring    | 1065.3        |
| 14    |                 |         |                 |         |                 | [12]     | <b>1679.6</b> | E ring    | 1154.8        |
| 15    |                 |         |                 |         |                 | [9]      | <b>1751.8</b> | E ring    | 1226.9        |
| 16    |                 |         |                 |         |                 | [8]      | <b>1810.9</b> | E ring    | 1286.0        |
| 17    |                 |         |                 |         |                 | [7]      | <b>1859.8</b> | E ring    | 1334.9        |
| 18    |                 |         |                 |         |                 | [6]      | <b>1900.8</b> | E ring    | 1375.9        |
| 19    |                 |         |                 |         |                 | [5]      | <b>1935.6</b> | E ring    | 1410.7        |
| 20    |                 |         |                 |         |                 | [3]      | <b>1965.2</b> | E ring    | 1440.3        |
| 21    |                 |         |                 |         |                 | A ring   | 1990.7        | E ring    | 1465.8        |
| 22    |                 |         |                 |         |                 | A ring   | 2012.8        | E ring    | 1487.9        |
| 23    |                 |         |                 |         |                 | A ring   | 2032.1        | E ring    | 1507.2        |
| 24    |                 |         |                 |         |                 | A ring   | 2049.0        | E ring    | 1524.1        |
| 25    |                 |         |                 |         |                 | A ring   | 2064.0        | E ring    | 1539.1        |
| 26    |                 |         |                 |         |                 | A ring   | 2077.2        | E ring    | 1552.3        |
| ↓     |                 |         |                 |         |                 |          | ↓             |           | ↓             |
| ∞     |                 |         |                 |         |                 | IE A [1] | <b>2239.5</b> | IE E [10] | <b>1714.6</b> |

A set of principal quantum numbers ( $n_f, n_i$ ) defines a transition in the hydrogen atom where  $n_i > n_f$ .

The column of integers on the far left contains values of  $n_i$ , the initial quantum number for the transition.

The row of integers along the top contains values of  $n_f$ , the final quantum number for a transition.

A photon energy  $E_p(n_f, n_i)$  in units of  $\text{cm}^{-1}$  is listed under each  $n_f$  and in a row where the initial quantum number is  $n_i$ .

Bolded  $E_p$ 's are assigned to individual satellites and ring inner edges in Saturn's satellite system.

Unbolded  $E_p$ 's contributed to the creation of the A ring and E ring. IE A is inner edge A ring.

The satellite index [ $i$ ] to the left of each bolded  $E_p$  is the index assigned to a satellite or ring edge in

Table 7. An [ $i$ ] value associates each  $E_p$  with a particular orbital radius of a satellite or ring edge in Saturn's system. There are no unpaired  $E_p$ 's or orbital radii. Most importantly limits

$E_p(7, \infty)$  and  $E_p(8, \infty)$  are associated with the inner radii of the A and E rings respectively.

All unbolded close  $E_p$ 's contribute to either the A or E ring of Saturn.

(Low  $E_p$ ) is indicated for  $E_p(7, 8)$  and  $E_p(8, 9)$  because they are out of the range of interest.

(High  $E_p$ 's) is indicated for many  $E_p$ 's because they are out of range of interest.

$E_p$ 's corresponding to  $n_f = 9$  or larger are not included. Apparently they did not create resonance.

