Description of the SCAN-CH tape

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The computation of our CH line list has been described in detail in the paper "Line intensities for CH and their application to stellar atmospheres" by Uffe Gråe Jørgensen, Mats Larsson, Atsushi Iwamae, and Bin Yu (1996, Astronomy & Astrophysics, **315**, 204−211, 1996). We refer the user of our tape to further details there, the purpose of this describtion is to clarify the meaning of each of the numbers on the tape itself. The figures 1−4 in our paper gives the term-diagrams of the involved transitions. We strongly recommend users of our line list to make themselves familiar with these figures. In particular, the precise definition of the quantum numbers and the naming of the branches are indicated in the figures. Also it is illustrated how to convert our use of the rotational quantum numbers to the value of the rotational quantum number N often used in older literature.

The SCAN-CH tape is structured with one line of information on the tape for each spectral line, and listed in order of increasing wave number (i.e., decreasing wave length). Each line of information on the tape is written in the format

I2,2I3, I4, I3, 1PE12.5, 0P 2F9.2, F7.2

(i.e., can be read in free format), and contain the values of the variables

el_trans, v_up, v_low, j_low, branch, gf, wnumber, exs, nu_iso

where

- el_trans is a identification of the electronic transition; el_trans = 1 indicates that the line is from the $X^2\Pi-X^2\Pi$ electronic transition, el_trans = 2 corresponds to the $A^2\Delta-X^2\Pi$ system, el_trans = 3 corresponds to the $B^2\Sigma^--X^2\Pi$ system, el_trans = 4 corresponds to the $C^2\Sigma^+-X^2\Pi$ system.

- v_up and v_low are the vibrational quantum numbers V' and V" at the upper and lower vibrational level, respectively.

- j_low is the value J"+0.5, where J" is the rotational quantum number of the lower level.

- branch identify the branch of the transition. For the rotational-vibrational transition, $X^2\Pi-X^2\Pi$, branch takes a value between 1 and 24, with the following meaning:

  1: R_{11ee};   2: R_{11ff};
  3: R_{22ee};   4: R_{22ff};
  5: Q_{11ef};   6: Q_{11fe};
  7: Q_{22ef};   8: Q_{22fe};
  9: P_{11ee};   10: P_{11ff};
  11: P_{22ee};   12: P_{22ff};

  For the $A^2\Delta-X^2\Pi$ electronic transition branch takes a value between 1 and 24, with the following meaning:

  1: R_{11ee};   2: R_{11ff};
  3: $^QR_{12ee}$;   4: $^QR_{12ff}$;
  5: $^SR_{21ee}$;   6: $^SR_{21ff}$;
  7: R_{22ff};   8: R_{22ee};
  9: Q_{11ef};   10: Q_{11fe};
  11: $^PQ_{12ef}$;   12: $^PQ_{12fe}$;

13: $^R Q_{21fe}$;   14: $^R Q_{21ef}$;
15: Q_{22fe};   16: Q_{22ef};
17: P_{11ee};   18: P_{11ff};
19: $^O P_{12ee}$;   20: $^O P_{12ff}$;
21: $^Q P_{21ff}$;   22: $^Q P_{21ee}$;
23: P_{22ff};   24: P_{22ee};

For the $B^2\Sigma^- - X^2\Pi$ electronic transition branch takes a value between 1 and 12, with the following meaning:
1: $^Q R_{12}$;   2: R_{22};
3: R_{11};   4: $^S R_{21}$;
5: $^P Q_{12}$;   6: Q_{22};
7: Q_{11};   8: $^R Q_{21}$;
9: $^O P_{12}$;   10: P_{22};
11: P_{11};   12: $^Q P_{21}$;

For the $C^2\Sigma^+ - X^2\Pi$ electronic transition branch takes a value between 1 and 12, with the following meaning:
1: $^Q R_{12}$;   2: R_{22};
3: R_{11};   4: Q_{11};
5: $^P Q_{12}$;   6: Q_{22};
7: $^S R_{21}$;   8: $^R Q_{21}$;
9: $^O P_{12}$;   10: P_{22};
11: P_{11};   12: $^Q P_{21}$;

- gf is the gf value (dimensionless).

- wnumber is the wavenumber in cm^{-1}

- exs is the excitation energy (in cm^{-1}) above the ground level of the lower level (v"=0, J"=0.5, F_1). We stress that exs is not the energy above the potential minimum as has been used in some previous line lists, but the energy above the ground level. The partition function used must correspond to this definition. A list of recommended partition functions is given in our paper for temperatures between 1000 and 8000 K.

- nu_iso is the isotopic shift $\nu(^{13}CH) - \nu(^{12}CH)$ (in cm^{-1}). The method used for computation of the isotopic shift has been described by U.G.Jørgensen, A&A 284, 179−186, 1994.