div_floor_mod_properties THM

```
⊢  ∀a:ℤ, n:ℕ+. a = (a ÷↓ n)·n+(a mod n) & (a mod n)<n
| by (RepeatFor 2 (Analyze 0))
|    THEN
|    (Unfolds [‘div_floor‘;‘modulus‘] 0)
|    THEN
|    (Repeat SplitOnConclITE)
|
|\
| .....truecase .....
| 1. a : ℤ
| 2. n : ℕ+
| 3. 0≤a
| ⊢  a = (a ÷ n)·n+(a rem n) & (a rem n)<n
|   by (Inst
|       Thm* ∀a:ℤ, n:ℤ-0.
|             a = (a ÷ n)·n+(a rem n)
|             & |a rem n|<|n|
|             & ((a rem n)<0 ⇒ a<0)
|             & ((a rem n)>0 ⇒ a>0)
|       {div_rem_properties}
|       [a;n])
|      THEN
|      (MoveToConcl -3)
|      THEN
|      (Unfold ‘absval‘ 0)
|      THEN
|      (RepeatFor 2 SplitOnConclITE)
|
|\
| .....truecase .....
| 1. a : ℤ
| 2. n : ℕ+
| 3. a<0
| 4. ((-a) rem n) = 0
| ⊢  a = (-((-a) ÷ n))·n+0 & 0<n
|   by Inst
|      Thm* ∀a:ℤ, n:ℤ-0.
|            a = (a ÷ n)·n+(a rem n)
|            & |a rem n|<|n|
|            & ((a rem n)<0 ⇒ a<0)
|            & ((a rem n)>0 ⇒ a>0)
|      {div_rem_properties}
|      [-a;n]
|
.\
. .....falsecase .....
. 1. a : ℤ
. 2. n : ℕ+
. 3. a<0
. 4. ¬((-a) rem n) = 0
. ⊢  a = (-((-a) ÷ n)+-1)·n+n-((-a) rem n) & n-((-a) rem n)<n
.   by (Inst
.       Thm* ∀a:ℤ, n:ℤ-0.
```

```
.            a = (a ÷ n)·n+(a rem n)
.            & |a rem n|<|n|
.            & ((a rem n)<0 ⇒ a<0)
.            & ((a rem n)>0 ⇒ a>0)
.       {div_rem_properties}
.       [-a;n])
.      THEN
.      (MoveToConcl -3)
.      THEN
.      (Unfold `absval` 0)
.      THEN
.      (RepeatFor 2 SplitOnConclITE)
.      THEN
.      ThinTrivial
END
```